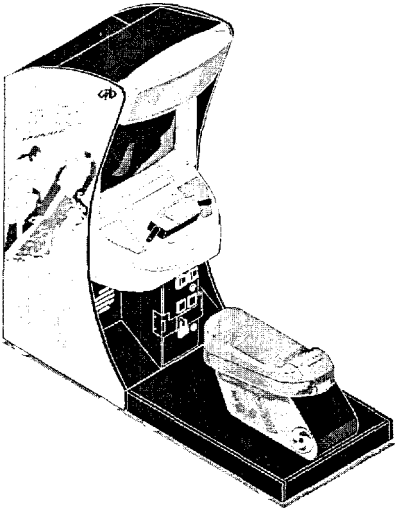
MIDWAY

NOVEMBER 2000
16-40089-I 01

ARCTIC THUNDER

Game Operations Manual for 27" Dedicated Video Game



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Manual Includes
Operation &Adjustments * Parts Information * Wiring Diagrams • Testing & Problem Diagnosis

The manufacturer intends that this game is to be operated for amusement purposes only and not in contravention of any federal. state or local law or regulation of the United States or any foreign country governing gaming devices. All operators of this game are responsible for its operation in accordance with such laws and regulations. The manufacturer's factory settings for this game may require adjustment in order to comply with laws applicable in an operator's specific jurisdiction. It is the operator's responsibility to determine whether adjustments are necessary and, if they are to make the appropriate adjustments prior to operating the amusement game.

MIDWAY AMUSEMENT GAMES. LLC
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DECLARATION OF CONFORMITY

MIDWAY AMUSEMENT GAMES, LLC

3401 N. CALIFORNIA AVE.
CHICAGO, IL 60618
U.S.A.

WE, HEREBY DECLARE UNDER SOLE RESPONSIBILITY THAT

THE MODEL: *"ARCTIC THUNDER" (27") 40289, 40389, 40489, 40689, 40789, 40989, 41089, 41189, 41289, 41389, 41489, 41789, 41889, 41989, 42089, 42189, 42289, 42389, 47189, 47289, 4B289*

TO WHICH THIS DECLARATION **RELATES IS** IN CONFORMITY WITH **THE FOLLOWING EUROPEAN PRODUCT SAFETY DIRECTIVES:**

ELECTROMAGNETIC COMPATIBILITY DIRECTIVE
(89/336/EEC AND AMENDMENTS 91/C162/08, 92/31/EEC,93/68/EEC)

ELECTRICAL EQUIPMENT DESIGNED FOR USE WITHIN CERTAIN VOLTAGE LIMITS DIRECTIVE
(73/336/EEC AND AMENDMENTS
88/C168/02, 92/C210/01. 93/68/EEC, 94/C199/03, 95/C214/02)

AS **IS** VERIFIED BY COMPLIANCE WITH **THE FOLLOWING** STANDARDS:

EN55014: 1993	**EN61000-4-2: 1995**	**EN61000-4-3: 1995**
EN61000-4-4: 1995	**EN61000-4-5: 1995**	**EN61000-4-6: 1995**
EN61000-4-11: 1994	**EN61000-3-2: 1995**	**EN61000-3-3: 1995**
EN60335-1: 1995	**IEC 60335-2-82: 1999**	

Date issued: **October 30, 2000**

DAN **GALARDE**

CORPORATE V.P. OF QUALITY

4 Refer to the manufacturer's instructions in order to set the hub switches for *LNK* (link) and *X* (cross-over) activity.

5 Fasten the hub to the bottom of the most central cabinet using a hook-and-loop type material. Orient the nub so that the indicator lights are visible and cable jacks are accessible

6 Make sure excess cable is tied into a coil and that all cables are routed through the notch in the rear door. Connect the AC adapter for the hub and all line cords to AC power

CAUTION

Do no: connect or disconnect any cable to the game electronics or hub with the power turned on Circuit disruptions may damage the game and void the warranty.

7. Switch on power and closely observe the screen for each cabinet during start up. Each automatically enters ATTRACT MODE if no errors are found Refer to *Troubleshooting* in the operation manual if errors are detected.

8. Verify software version compatibility for each game machine. Newer versions may contain instructions previous versions do not causing games to halt or reset at random.

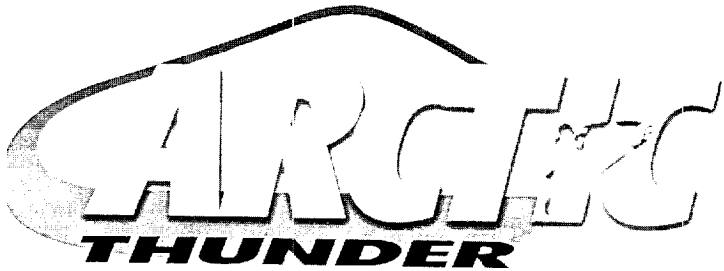
   Unlock the coin door for each cabinet to access the operator control buttons inside coin vault Press and hold the TEST button to enter the menu system. Select SYSTEM INFORMATION MENU at the Main Menu screen. Scroll to SOFTWARE VERSION and press the TEST button. Observe screen for desired information

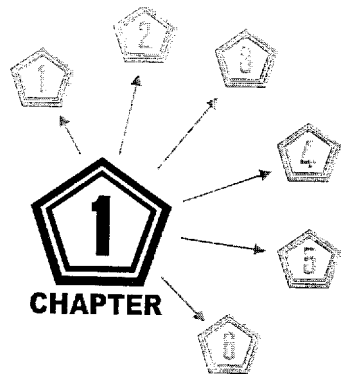
9. Assign game machine a link number. Select ADJUSTMENTS from **the Main Menu** screen. Scroll to and select GAME LINK NUMBER by pressing the Test button. Assign a linking number ranging from 1 to 3 to each game cabinet.

   NOTE: Each cabinet must have its own individual and unique number. The first cabinet on the left is always cabinet 1, **the** second is cabinet 2. etc.

10. Repeat these steps for each remaining game cabinet you wish to link

11. Close and lock the coin ooor, and reinstall and lock the rear door for each cabinet Lower the leg levelers for each cabinet until the casters do not touch the floor and the cabinets are level. Lock the leveiers in position by tightening tne nuts provided.





OPERATIONS

SAFETY INSTRUCTIONS

The following safety instructions apply to operators and service personnel. Read these instructions before servicing or preparing the Video Game Machine (VGM) fo- play. Other safety instructions appea- throughout this manual.

DEFINITIONS OF SAFETY TERMS

- DANGER indicates an imminent hazard. If you fall to avoid this hazard, it WILL cause death or serious injury
- WARNING Indicates a potential hazard. If you fail to avoid this hazard. it COULD cause death or serious injury.
- CAUTION indicates a potential hazard If you fall to avoid this hazard. it MAY cause minor or moderate injury. CAUTION also alerts you about unsafe practices
- NOTE indicates information cf special importance.

Y WARNING: TRANSPORTING GAMES.
The VGM contains glass and fragile electronic deuces. Use appropriate care when transporting. Avo d rough handling when moving the cabinet. Do not move with the power switched on.

WARNING: DISC-ONNECT POWER.
Always turn tne power OFF and unplug the VGM before attempting service or adjustments unless otherwise Instructed. Installing or repairing boards with power switched on can damage components and void the warranty

WARNING: GROUND GAMES.
Avoid electrical shocks! Do not plug in a VGM until you have Inspected and properly grounded it Only plug this game into a grounded, three-wire outlet. Do not use a "cheater" plug or cut off the ground pin on the line cord.

WARNING: AVOID ELECTRICAL SHOCKS.
The VGM system does not utilize an isolation transformer. Internal cabinet AC is not isolated from the external AC line.

WARNING: HANDLE FLUORESCENT TUBE AND CRT WITH CARE.
If you drop a fluorescent tube or CRT and ii breaks, it will Implode! Shattered glass, can fly eight feel or more from the implosion.

CAUTION: CHECK POWER SELECTOR, LAMP.
Set the 115/230VAC selector on the power supply for the correct line voltage. Check the selector setting before switching on the VGM. Verify that the fluorescent lamp assembly is correct for tne local line voltage.

CAUTION: USE PROPER FUSE.
Avoid electrical shock! Replacement fuses must be identically rated. Fuse voltage and current ratings must be identically rated to the original fuse.

CAUTION: ATTACH CONNECTORS PROPERLY.
Be sure board connectors mate properly. if connectors do not slip cn easily. do not force them. A reversed connector may damage the VGM and void the warranty. Connector keys only allow a connector to fit one set of pins on 2 board

CAUTION: USE CARE WHEN SHIPPING HARD DISKS.
The hard disk drive must be packed ir an anti-static bag. When shipping the drive for repair or replacement. pack it in an approved container (P/N 08-8068). Do not stack or drop hard disk drives.

WARNING: HAZARD TO EPILEPTICS.
A very small portion of the population has a condition which may cause them to experience epileptic seizures or have momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are present in our daily environment. These persons may experience seizures while watching some kinds of television pictures or playing certain video games. People who have not had any previous seizures may nonetheless have an undetected epileptic condition.

If you or anyone in your family has experienced symptoms linked to an epileptic condition (e.g., seizures or loss of awareness). immediately consult your physician before using any video games.

We recommend that parents observe their children while they play video games. If you or your child experience the following symptoms: dizziness. altered vision, eye or muscle twitching, involuntary movements. loss of awareness disorientation, or convulsions, DISCONTINUE USE IMMEDIATELY and consult your physician

PRODUCT SPECIFICATIONS

Operating Requirements

Location	Electrical Power	Temperature	Humidity
Domestic	120VAC @ 60Hz 4.0 Amps	32°F to 100-F	Not to exceed 95% relative
Foreign	230VAC @ 50Hz 2.0 Amps	(0°C to 38°C)	
Japan	100VAC @ 50Hz 4.0 Amps		

Cabinet statistics

Shipping Dimensions
Width 30" (76.2 cm)
Depth 62" (157.4 cm
Height 78" (198 cm

Shipping Weight (Approx.)
350Lbs (158kg) Main Cabinet
125Lbs (57kg) Seat Assy

Design Type
Sit-On Dedicated Video Game Machine with Steering Feedback

Game Characteristics

Player Variables
1 to 4 players per VGM (with Linking)
High Score Recognition
Suitable for All Ages (AAMA Certified)

Operator Variables
Coinage, Play Mode, Difficulty, Volume Audits, Statistics

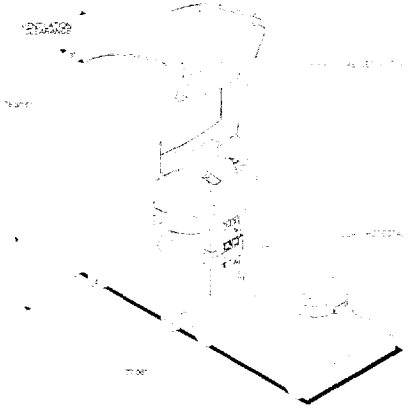
Diagnostics
Automatic Power-Up Self-Test
Manual Multi-Level Menu System

Equipment Characteristics

Video Display Monitor
VGA Resolution
27" (68.6 cm) CRT

Audio System
Digital Stereo
5" (12.7 cm) Coaxial Full Range Speakers

Currency Acceptors
2 Coin Mechanisms
Dollar Bill Validator Ready
Electronic Coin Acceptor Ready



PRODUCT CONFIGURATION

- **Stand Alone Video Game Machine**
  Each VGM is ready to play right out of the box. Operators, may use the menu screens in the game menu system to determine some player variables in advance or leave the choices up to the players

- **Linked Video Game Machines**
  Linking allows players to compete against each other on a single course. Operator menus are used the same way as in stand-alone game machines. Crossover couplers and linking cables to connect two VGMs are factory installed. Use an optional 10 base-T ethernet hub to interconnect up to four VGMs

SET-UP

1. Remove all items from shipping containers and set them aside. Remove all packaging material. Inspect exterior of the main cabinet and sea? pedestal for any damage.

> WARNING
> Cabinet is top heavy. Do not push against plastic parts during movement

2. Remove keys from controller assembly. Unlock and open rear door. coin box and cash box. Electrical cords, mechanical components, and assorted spare parts are packed inside cash box. Casters and leg levelers for the cabinet and pedestai are packed inside of a box with the seat pedesiai.

3. Locate casters, leg levelers and related mounting hardware

3. Install one nut onto each leg leveler Tilt main cabinet as needed to locate threaded holes in underside of cabinet. Install a leveler and nut into each hole. Do not tighten nuts at this time. Repeat these steps for seat pedestal as well.

5. Install the provided swivel casters. Install the six (6) swiveling casters on the main cabinet and seat pedestai as shown in the illustration below.

6 Install provided locking casters. Install the twc (2) locking casters on seat pedestal as shown in the illustration below.

LOCATION ***OF CASTERS AND LEVELERS***

7. Roil cabinet to its intended location maintaining clearance between the cabrnet and walls, drapes other games or obstructions.

8. Locate the pedestal assembly mounting rails and rubber bumper spacers. which are shipped along with the hardware. inside a cash box.

9 Install rubber bumpers Rubber bumpers are used to maintain a 3/16" space between the pedestal and cabinet assembly. and are essential in absorbing vibration insert one bumper using a twisting motion into each of the pre-drilled holes located along the bottom edge oi main cabinet assembly

10 Install pedestal mounting rails Orien: the mounting rail so that the pre-attached rubber bumpers face outward, then insert rail. Fasten rail in place with the hardware provided. If necessary refer to illustration for proper placement.

11 Roll pedestal section near main cabinet, align opening in the pedestal with the ends of the ra is mounted in main cabinet. Slide tre pedestal forward onto extended mounting rails leaving enough space to attach the wiring harness Mate each cable connector and press firmly to seat the contacts Ensure no wires are pinched during pedestal attachment

Attach pedestal assembly using 1/4-20 tamper resistant screws and large flat washers provided. A T27 wrench is included to tighten these screws firmly.

LOCATION OF PEDESTAL ASSEMBLY MOUNTING HOLES

12 Lower and adjust each leg leveler until the pedestal section is stable and level. Adjust the levelers until the bottoms of *all* pieces are *flush and* parallel with each other. Inspect for *binding* or *pinched wires.* then firmly tighten the fasteners to attach the two pieces together as a single unit.

13. An extra padlock may be installed to secure rear door Locate hasp. Remove the two lock bracket nuts from inside the cabinet, above the rear door opening. Slide the hasp bracket onto the bolts so tha: it protrudes from the hole in back of the cabinet. then reinstall nuts

TYPICAL REAR DOOR HASP INSTALLATION

14. Modify the lock plate at the top of the rear door. Remove the bolts and nuts from the lock plate. then rotate the plate so that the slot will be above the door. Reinstall the bolts and nuts and tighten firmly.

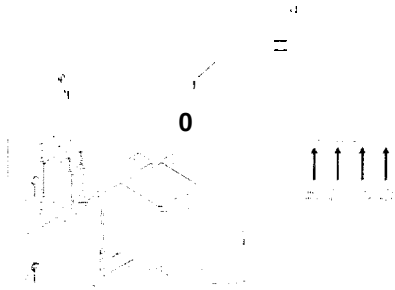
15. Reinstall the rear door onto the cabinet and close it. Lock the rear door and remove the key. If required, install the extra padlock through the hasp at this time. install the screws at the top and srdes of the rear door and tighten snugly. Leave the remaining doors open at this time.

LINE CORD INSTALLATION

16. The power cord is packed in with the spare parts. insert a portion cf the line cord in the cord clamp leaving enough slack for the cord. Match the holes on the IEC plug with the prongs in the receptacle and push firmly to seat the line cord.

17. Plug the game into a grounded (3-terminal) AC wall outlet. Switch on power to the game using the *ON/OFF* switch located on the upper left top of -he cabinet (when viewed from the player's positron). The game will power up and begin its self test. If no errors are found. the game will automatically enter the attract mode of operation (scenes and sounds from typical races. player's scores, messages, etc.).

18 Open the corn door. Press and hold the *Begin* Test button on the operator control switch panel to enter the menu system. Wait until the Main Menu screen appears on the monitor.



TYPICAL COIN DOOR SWITCH LOCATION

19 Follow on-screen instructions to select Diagnostics. then choose **SWITCH TESTS.** Follow the on-screen instructions to verity that each of the controls is operational. If no errors are found, the controls should function well.

20 Return to the Diagnostics screen, then choose **CONTROLLER TEST.** Follow the on-screen instructions to veriiy the presence of steering resistance. If no errors are iound, the aim will be good.

21. Return to the Main Menu screen, and then choose **EXIT.** The game will automatically enter its attract mode of operation (scenes and sounds from typical races, player's scores. messages. etc.).

22. Insert currency or tokens and play a game. Change the volume and make any other adjustments Close and lock al! open doors. Tighten the leveler nuts and engage the caster locks

MAINTENANCE

- **Viewing Glass**

It is not necessary to switch off power tc the game to clean the glass. Apply a mild glass cleaner to a clean cloth or sponge and wrpe the viewing glass.

Do ***not apply*** the cleaner ***directly*** on ***the*** g/ass! Liquid could drip down into switch or control circuits and cause erratic game operation.

- **Player Controls**

Use plastic-safe, non-abrasive cleaners to avoid damage Apply cleaner to a clean cloth or sponge and wipe the player controls.

Do not apply the cleaner directly on the controls!

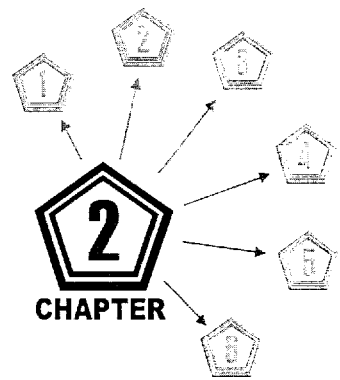
- **Cabinet and Seat**

Use plastic-safe, non-abrasive cleaners to avoid damage. Apply cleaner to a clean cloth or sponge and wipe the seat or cabinet.

Do not apply cleaner directly on artwork or cabinet'

CONTROL BUTTONS

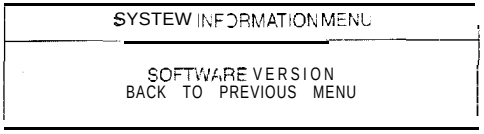
- TEST BUTTON activates game Menu System. Press the Test button to access the Main Menu and select individual diagnostics, audits utilities, etc.
- *VOLUME-UP BUTTON* is used to move up through menu selections or adjustment items as well as to Increase volume level in game play.
- VOLUME-DOWN BUTTON is used to move down through menu selections or adjustment items. as well as to decrease volume level in game play.
- *SERVICE CREDIT BUTTON* is used to allot credits without affecting a game's bookkeeping total. This button is also used to exit a menu selection or return to the main menu



ADJUSTMENT, DIAGNOSTIC & AUDIT MENUS

Main Menu, continued
System Information Menu

SYSTEM INFORMATION MENU
To verify the game's software version. reset information. or to clear reset information. select System Information Menu from the Main Menu. then press the Test button Select and perform desired function.

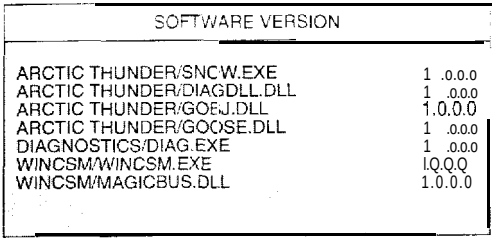


To return to Main Menu, select Back to Previous Menu and press the Test button

Main Menu, continued
System Information Menu
Software Version

SOFTWARE VERSION

To verify game software version, select System Version from the System Information Menu. Observe screen for desired Information.



To return to the submenu, press the Test button to return to the Main Menu select Back To Previous Menu and press the Test button

Main Menu, continued
Audits Menu

AUDITS MENU
To view a game's play statistics, select Audits Menu from the Main Menu. tnen press the Test button. Use the Volume buttons to scroll to desired audit item, tnen press the Tes! button. Follow on-screen instructions where necessary

The left-hand side of an audit table displays the name of the audit Item: the right-hand side shows the amount of play for that item as either a percentage. an average. or as elapsed time. *Please* note, record these statistics prior to performing any service or repairs.

Main Menu, continued

Audits Menu, continued

```
AUDITS MENU

GENERAL GAME AUD TS
WASHINGTON. D.C
SWISS ALPS
CHERNOBYL
HIMALAYAN
ALASKAN PIPELINE
HAUNTED FOREST
COIN AUDITS
CREDIT AUDITS
SYSTEM AUDITS
WATCHDOG AUDITS
CLEAR ALL
BACK TO PREVIOUS MENU
```

To return to submenu while viewing an audit table, press the Test button; to return to the Main Menu select Back To Previous Menu and press the Test button.

Main Menu, continued

Audits Menu

General Game Audits

GENERAL GAME AUDITS

To view game audits. press the Volume Up or Volume Down button to select General Game Audits from the Audits Menu, then press tne Test button Observe screen for desired information.

GENERAL GAME AUDITS

TOTAL UPTIME	2DAYS 09:09:11	WILLIE QUINN SELECTED	(X/X) 0.0%
TOTAL PLAYTIME	2DAYS 02:23:10	PONZO SELECTED	(X/X) 0.0%
PERCENTAGE PLAYTIME	(9/32) 25%	CANDY ICE SELECTED	(X/X) 0.0%
GAMES STARTED	32	SLED 1 SELECTED	(X/X) 0.0%
AVERAGE GAME TIME	2DAYS 01:12:15	SLED 2 SELECTED	(X/X) 0.0%
PERCENTAGE FREE GAMES	0.0%	SLED 3 SELECTED	(X/X) 0.0%
TOTALTIME-OUT PERCENTAGE	0.0%	SLED 4 SELECTED	(X/X) 0.0%
GAME CONTINUES PERCENTAGE	(X/X) XX%	SLED 5 SELECTED	(X/X) 0.0%
INITIALS ENTERED	(X/X) XX%	SLED 6 SELECTED	(X/X) 0.0%
1 PLAYER GAME	(X/X) XX%	WASHINGTON, DC SELECTED	(X/X) 0.0%
2 PLAYER GAME	(X/X) XX%	SWISS ALPS SELECTED	(X/X) 0.0%
3 PLAYER GAME	(X/X) XX%	CHERNOBYL SELECTED	(X/X) 0.0%
4 PLAYER GAME	(X/X) XX%	HIMALAYAN SELECTED	(X/X) 0.0%
5 PLAYER GAME	0.0%	ALASKAN PIPELINE SELECTED	(X/X) 0.0%
6 PLAYER GAME	0.0%	HAUNTED FOREST SELECTED	(X/X) 0.0%
7 PLAYER GAME	0.0%	PLAYER WIPE-OUTS AVERAGE	(X/X) 0.0%
8 PLAYER GAME	0.0%	PUP BOOST AVERAGE	(X/X) 0.0%
PERCENTAGE ATTACK USED	0.0%	PUP MISSILE AVERAGE	(X/X) 0.0%
PERCENTAGE NO DRONES	0.0%	PUP SHIELD AVERAGE	(X/X) 0.0%
PERCENTAGE NO CATCH-Up	0.0%	PUP SUPER ATTACK AVERAGE	(X/X) 0.0%
DIRTY MCKURDY SELECTED	(X/X) 0.0%	PUP HEALTH AVERAGE	(X/X) 0.0%
MAI ZHOU LIN SELECTED	(X/X) 0.0%	PUP TRICK AVERAGE	(X/X) 0.0%
AGENT 5 SELECTED	(X/X) 0.0%		

RETURN CLEAR

Main Menu. continued

***Audits* Menu**

General Game Audits. continued

To reset *audit table* select Clear located at the bottom of screen. then press the Tes! button. To leave *table as it is*, select Return located at **the** bottom of screen, then **press the Test** button *Please note*, be sure to record any values prior to clearing table

To return to the submenu. press the Test button: **to return to the** Main **Menu select Return and press** the Test button

Main Menu, continued

Audits Menu

Washington, D.C. Audits (All track audits)

WASHINGTON, D.C. AUDITS

To observe the audits screen for any one of the featured tracks, use the Volume Up or Volume Down button to select the desired audit. then press the Test button.

Observe screen fcr desired information. *Please note*, each sled track listed in the Audit Menu contains information identical to information shown in the table below.

To *reset audit table* select Clear located at the bottom of screen. then press the Test button. ***To leave*** *table* as *it* is. select Return located at the bottom of screen, then press the Test button f/ease ***note.*** be sure to record any values prior to clearing table.

ARCTIC THUNDER **WASHINGTON** DC

TRACK SELECTED	(X/X) 0.0%	TIMED AT 90	PERCENTAGE	(X/X)	0.036
TRACK SINGLE PLAYER	(X/X) 0.0%	TIMED AT 95	PERCENTAGE	(X/X)	0.0%
FREE GAME AWARD	(X/X) 0.0%	TIMED AT 100	PERCENTAGE	(x/x)	0.0%
TIME-OUT	(X/X) 0.0%	TIMED AT 105	PERCENTAGE	(X/X)	0.0%
PLACED 1 ST	(X/X) 0.0%	TIMED AT 110	PERCENTAGE	(X/X)	0.0%
PLACED 2ND	(X/X) 0.0%	TIMED AT 115	PERCENTAGE	(X/X)	0.0%
PLACED 3RD	(X/X) 0.0%	TIMED AT 120	PERCENTAGE	(X/X)	0.0%
PLACED 4TH	(X/X) 0.0%	TIMED AT 125	PERCENTAGE	(X/X)	0.0%
PLACED 5TH	(X/X) 0.0%	TIMED AT 130	PERCENTAGE	(X/X)	0.0%
PLACED 6TH	(X/X) 0.0%	TIMED AT 135	PERCENTAGE	(XIX)	0.0%
PLACED 7TH	(X/X) 0.0%	TIMED AT 140	PERCENTAGE	(X/X)	0.0%
PLACED 8TH	(X/X) 0.0%	TIMED AT 145	PERCENTAGE	(X*X)	0.0%

RETURN CLEAR

To return to the submenu. press the Test button to return to the Main Menu select Return and press the Test button

Main Menu, continued

Audits Menu

Coin Audits

COIN AUDITS

To view corn audits use the Volume Up o· Volume Down button to select Coin Audits from the Audits Menu then press the Test button Observe screen for desired information.

70 reset *audit* fable. select Clear located at the bottom of screen. then press the lest button *To* leave *table* as *it is.* select Return located a! the bottom of screen, then press the Test button *Please note,* be sure to record any values prior to clearing table

COIN AUDITS	
LEFT SLOT COINS	X
RIGHT SLOT COINS	X
BILLS	X
CENTER SLOT COINS	X
EXTRA SLOT COINS	X
SERVICE CREDIT	X
TOTAL PAID CREDIT	X
TOTAL	$X.XX
RETURN CLEAR	

To return to the submenu. press the Test button, to return to the Main Menu select Return and press the Test button

Main Menu, continued

***Audits* Menu**

Credit Audits

CREDIT AUDITS

To view credit audits use the Volume Up or Volume Down buttor to select Credit Audits from the Audits Menu. then press the Test button Observe screen for desired information.

To reset audit fable. select Clear located at the bottom of screen. then press the Test button. *To leave table as* if *is.* select Return located at the bottom of *screen,* then press the Test button. *Please* note, be sure to record any values prior to clearing table.

CREDIT AUDITS
CREDIT AVAILABLE X
RETURN CLEAR

To return to the submenu, press the Test button: to return to the hlain Menu select Return and press the Test button

Main Menu, continued

Audits Menu

System Audits

SYSTEM AUDITS

To view system audits, use the Volume Up or Volume Down button to select System Audits from the Audits Menu, then press the Test button Observe screen for desired information

To reset audit *table*, select Clear focated at the bottom of screen, then press the Test button. **NOTE: Be sure** to record any values prior to clearing table *To* leave *table* as *it is* select Return located at the bottom of screen, then press the Test button

SYSTEM **AUDITS**

GAME STARTUPS	X
GAME RESTARTS	X
CSM STARTUPS	X
GAME NE'S	X
GAME AE'S	X
GAME IF'S	X
GAME UPTIME	X DAYS 00:00:00
SYSTEM UPTIME	X DAYS 00:00:00

RETURN CLEAR

To return to the submenu, select Return and press the Test button: to return to the Main Menu scroll to Return and press the Test button.

Main Menu, continued

Audits Menu

Watchdog Audits

WATCHDOG AUDITS

To either view or clear information about the watchdog use the Volume Up or Volume Down button to select Watchdog Audits from the Audits Menu then press the Test button. Observe screen for desired information.

To reset audit table, *select* Clear focated at the bottom of screen. then press the Test button. **NOTE: Be** sure to record any values prior to clearing table. *To leave table* as *it* is. select Return located at the bottom of screen, then press the Test button.

WATCHDOG AUDITS

VIE'S; WATCHDOGS
CLEAR WATCHDOGS
BACK TO PREVIOUS MENU

To return to the submenu. select Return and press the Test button: to return to the Main Menu scroll to Return and press the Test button

Main Menu, continued

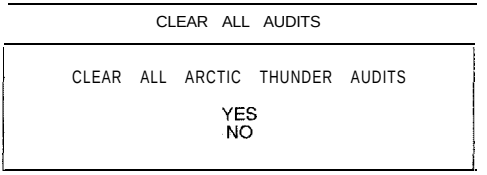
Audits Menu

Clear All Audits

CLEAR ALL AUDITS

To clear all game audits use the Volume Up or Volume Down button to select Clear All Audits from the Audits Menu, then press the Test button

Use the Volume buttons to select desired answer, then press the lest button. Observe a confirmation box appears on-screen to verify a selection was made.



To return to the submenu, select Return and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

Main Menu, continued

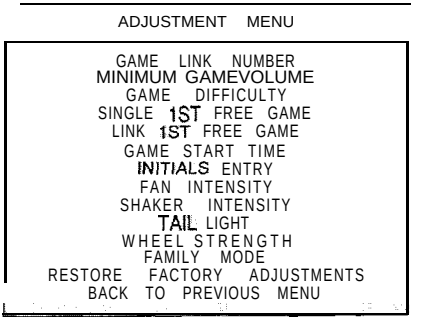
Adjustments Menu

ADJUSTMENTS MENU

To optimize game performance and earnings or to change the look or sound of the game, use the Volume Up ***or*** Volume Down button to select Adjustment Menu from the Main Menu, then ***press*** the Test button.

The Adjustments Menu enables customization of Attract Mode, fan and seat shaker intensity, game difficulty, as well as a whole host of other features. Please note, individual Game Adjustments are explained in more detail on the following pages.

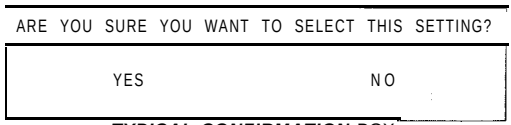
To select a menu option in Adjustments use the Volume buttons to select it, then press the Test button



Main *Menu, continued*
Adjustments Menu, continued

Many line items in the Adjustments Menu provide multiple setting choices, a few of which are followed by a confirmation box as shown below to verify your selection prior to completing the request.

Be sure to read each option carefully, use the Volume buttons to select YES or NO, then press the Test button to lock in the setting. Selecting NO cancels any changed values and returns the previous values to memory.



TYPICAL CONFIRMATION BOX

Main Menu, continued
Adjustments Menu
Game Link Number

GAME LINK NUMBER
Allows the game link number to be set. The setting **range** is:

-Maximum: 4
-Minimum: 1
-Factory Setting: 1

Main* Menu, *continued
Adjustments Menu
Minimum Game Volume

MINIMUM GAME VOLUME
Selects the minimum allowable setting for volume. The setting range for this adjustment is:

-Minimum: 0
-Maximum: **255**
-Factory Setting: 20

Main Menu
Adjustments Menu
Game Difficulty

GAME DIFFICULTY
Determines level of difficulty during game play. **The** setting range **is:**

-Easiest
-Easy
-Normal
-Hard
-Hardest
-No Change
-Factory **Setting: Normal**

Main Menu
Adjustments Menu
Single First Free Game

SINGLE FIRST FREE GAME
Enables the single play "free game for first place" option. The setting choices are:

-Enable (Award free game)
-Disable
-No Change
-Factory Setting: Enable

Main Menu
Adjustments **Menu**
Linked First Free Game

LINKED FIRST GAME FREE
Awards free game to top player in a 2. 3, 4 or more player race. The setting choices are:

-Off (Does not award a free game in linked games)
-Must Beat All Drones (In a game with one or more linked players, **a** free game is only awarded if each of the drones and linked players lose)
-Two Players (In a game with at least two linked players, a free game is only awarded if the other linked player loses)
-Three Players (In a game with at least three linked players, a free game is only awarded if the other linked players lose)
-Four Players (In a game with at least four linked players, a free game is only awarded if the other linked players lose)
-No Change
-Factory **Setting: Off**

Main Menu
Adjustments Menu
Game Start Time

GAME START TIME

Adjusts the **game start time. The** setting choices are:

-Minimum: 45
-Maximum: 90
-Factory Setting: 55

Main Menu
Adjustments Menu
Initials Entry

INITIALS ENTRY

Enables players to enter their initials upon earning a high score, and displays high scores during attract mode. The setting range is:

-Enable
-Disable
-No Change
-Factory **Setting: Disable**

Main Menu
Adjustments Menu
Fan Intensity

FAN INTENSITY

Determines fan speed during game play. The setting range is:

-Easy
-Medium
-Hard
-Off
-No Change
-Factory Setting: Medium

Main Menu
Adjustments Menu
Shaker Intensity

SHAKER INTENSITY

Determines shaker rate during game play. The setting range is:

-Easy
-Medium
-Hard
-Off
-No Change
-Factory Setting: Medium

Main Menu
Adjustments Menu
Tail Light

TAIL LIGHT
Enables tail light illumination. The setting choices are:

-Enable
-Disable
-No Change
-Factory Setting: Enable

Main Menu
Adjustments Menu
Wheel Strength

WHEEL STRENGTH
Selects degree of wheel strength to be used for racing. The setting range is:

-Very Light
-Light
-Normal
-Heavy
-Very Heavy
-No change
-Factory Setting: Very Heavy

Main Menu
Adjustments, continued
Family Mode

FAMILY MODE
Changes appearance of female character seen on logo screen. The setting range is:

-Disable (Lewd appearance)
-Enable (Conservative appearance)
-No change
-Factory Setting: Disable

Main Menu
Adjustments, continued
Restore Factory Adjustments

RESTORE FACTORY ADJUSTMENTS
Allows operator to restore all game settings to the original factory default settings. The setting range is:

-Yes
-No
-Factory Setting: No

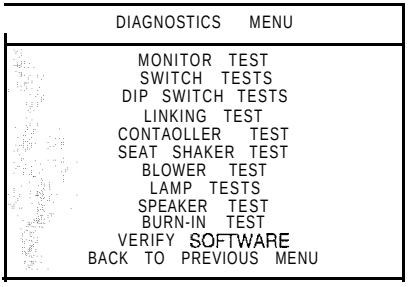
Main Menu, continued

Diagnostics Menu

DIAGNOSTIC MENU

To verify condition of the electrical and electronic hardware in the game use the Volume Up or Volume Down button to select Diagnostics Menu from the Main Menu, then press the Test button.

Diagnostic tests assist in checking and adjusting the game's major systems. It is important to periodically run diagnostics to improve and maintain game performance and player satisfaction.



Use the Volume buttons to select desired Diagnostic Menu option, then press Test button to enter

To return to the Main Menu select Back To Previous Menu and press the Test button

Main Menu

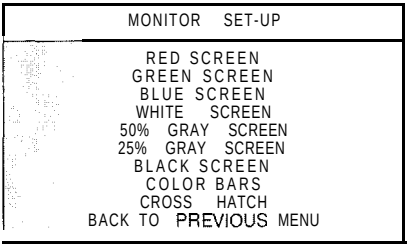
Diagnostic Menu, continued

Monitor Setup

MONITOR SET-UP

To verify color clarity of the monitor use the Volume Up or Volume Down button to select Monitor Setup at the Diagnostic Menu, then press the Test button.

Within the Monitor Set-up menu use the Volume buttons to select desired monitor setting, then press the Test button. Observe screen disolavs desired information and then automatically returns to the Monitor Set-Up Menu



Main *Menu*
Diagnostic Menu, continued
Monitor Setup, continued

COLOR BARS. Observe 4 color bars in different shades appear on-screen as aids in adjusting the green. blue, and red color levels. Each color should appear sharp and clear. Check video brightness and contrast

The CROSSHATCH PATTERNS test fills the screen with a series of dots within a grid. Observe the dots are perfectly round and that both the grid and dots are clear. inspect monitor convergence, linearity, and screen size.

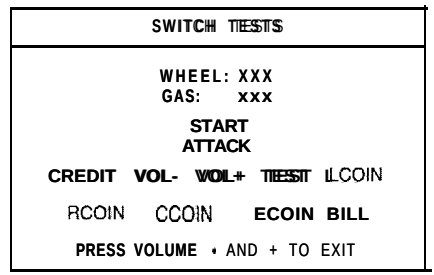
The single color screens, RED SCREEN, BLUE SCREEN, GREEN SCREEN, etc., fill the screen with a single color to be observed for complete saturation and clarity.

If any of the tests show a need for CRT adjustment, use the proper knobs on the Monitor Controls board

To return to the submenu, select Return and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

Main Menu
Diagnostic Menu, continued
Switch Tests

SWITCH TESTS
To verify proper operation of game switch and button inputs use the Volume Up or Volume Down button to select Switch Test at the Diagnostic Menu, then press the Test button.



Press any switch on the control panel or coin door to cause the corresponding indicator on the screen to illuminate. Each illuminated square represents one completed switch circuit.

Press both Volume buttons simultaneously to return to the submenu: to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

Main Menu

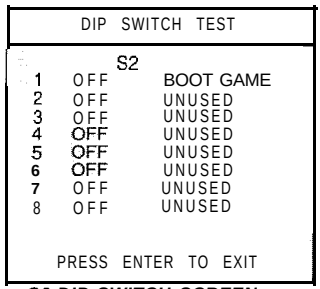
Diagnostic *Menu, continued*

DIP Switch Test

DIP SWITCH TEST

To verify proper DIP switch setting use the Volume Up or Volume Down button to select DIP Switch Test at the Diagnostic Menu, then press the Test button.

The current settings will appear on-screen. The default switch position for switch one through 8 is OFF for standard operation. For information about DIP Switch settings refer to Chapter 5: Wiring.



S2 DIP SWITCH SCREEN

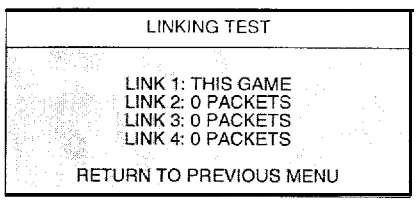
Main Menu

Diagnostic Menu, continued

Linking Test

LINKING TEST

To verify communications between a game machine and others linked to it use the Volume Up or Volume Down button to select Linking Test at the Diagnostic Menu. then press the Test button.



This diagnostic runs automatically and will display results on-screen

To return to the submenu, select Return to Previous Menu and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and cress the Test button.

Main Menu

Diagnostic Menu, continued

Controller Test

CONTROLLER TEST

To verify the proper directional movement of the controller assembly use the Volume Up or Volume Down button to select Controller Test at the Diagnostic Menu, then press the Test button.

Please note avoid contact with controller assembly when conducting any of the controller tests because the controller automatically turns on its own.

Use the Volume buttons to select desired controller test option, then press Test button to enter

CONTROLLER TEST
CALIBRATE FEEDBACK
CONTROLLER CENTER
CONTROLLER LEFT
CONTROLLER RIGHT
CONTROLLER INFO
BURN-IN TEST
RETURN TO PREVIOUS MENU

Observe and follow the on-screen instructions when conducting a test. A message will appear on-screen indicating a completed test. Press the Test or Start button to exit test once this message appears.

CALIBRATE FEEDBACK performs a complete calibration sequence which turns the controller to the left, to the center and to the right at a variety of speeds. This is the most complete test for the controller.

The CONTROLLER CENTER, CONTROLLER LEFT, AND CONTROLLER RIGHT are individual control-specific tests and will perform only the test specified by the name.

The CONTROLLER INFO test does not automatically turn the controller and requires operator input to terminate the test.

BURN-IN TEST performs the same tests as the Calibrate Feedback option, except it does so in a continuous uninterrupted cycle. To exit this test mode the game machine must be powered off.

Main Menu

Diagnostic Menu, continued

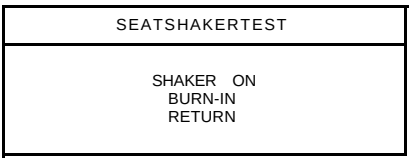
Seat Shaker Test

SEAT SHAKER TEST

To verify the proper functionality of the shaker assembly use the Volume Up or Volume Down button to select Seat Shaker Test at the Diagnostic Menu, then press the Test button.

Use the Volume buttons to select desired shaker test, then press the Test button. Please note, the seat shaker is immediately and automatically engaged once the Test button is pressed.

Main Menu
Diagnostic Menu, continued
Seat Shaker Test, continued



The SHAKER ON test performs a complete shaker vibration sequence at a variety of speeds. This is the most complete test for the seat shaker. Observe seat vibration.

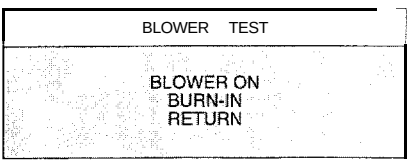
The **BURN-IN TEST** performs the same tests as the Shaker On option, except it does so in a complete, uninterrupted cycle. To exit this test mode the game machine must be powered off. Observe seat vibration.

To end seat shaker test, press the Test button. To return to the submenu, select Return and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

Main Menu
Diagnostic Menu, continued
Blower Test

BLOWER TEST
To verify the proper functionality of the fan assembly use the Volume Up or Volume Down button to select Blower Test at the Diagnostic Menu, then press the Test button.

Use the Volume buttons to select desired blower test. then press the Test button. The fan blower is immediately and automatically engaged once the Test button is pressed.



BLOWER ON performs a complete blower sequence at a variety of speeds. This is the most complete test of the blower. Observe breeze emitted from fan blower located in the center of the back-lit marquee.

BURN-IN TEST performs the same tests as the Blower On test option, except it does so in a complete, uninterrupted cycle. To exit this test mode the game machine must be powered off. Observe breeze emitted from fan blower located in the center of the back-lit marquee.

To end fan blower test, press the Test button. To return to the submenu, select Return and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

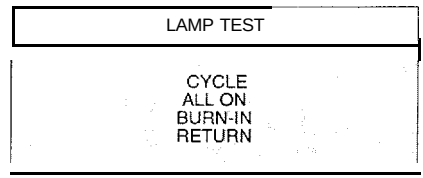
Main Menu

Diagnostic Menu, continued

Lamp Test

LAMP TEST

To detect intermittent or faulty incandescent bulbs use the Volume Up or Volume Down button to select LAMP TEST at the Diagnostic Menu. This test ensures that the incandescent bulbs critrcal to game operation function properly.



Use the Volume Up or Volume Down button to select desired Lamp Test and press the Test button. During the test observe the Lamp(s) turn ON according to the option selected.

To return to the submenu, select Return and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

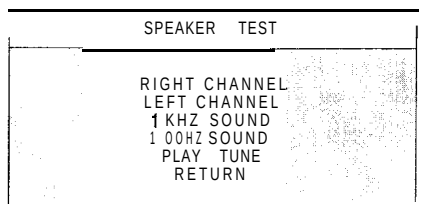
Main Menu

Diagnostic Menu, *continued*

Speaker Test

SPEAKER TEST

To verify the proper functionality of the speaker assemblies use the Volume Up or Volume Down button to select Speaker Test at the Diagnostic Menu, then press the Test button.



RIGHT CHANNEL. Tests the functionality of the speaker located on the right-hand side of the game cabinet by emitting an audible voicing of the word “right.”

LEFT CHANNEL. Tests the functionality of the speaker located on the left-hand side of the game cabinet by emitting an audible voicing of the word “left.”

The 1 KHz and **100Hz Sound** tests are audible tones emitted from both speakers on the game cabinet

Play Tune test option emits audible music from the game using both speakers on the game cabinet.

Main Menu
Diagnostic Menu, continued
Burn-In Tests

BURN-IN TESTS

To properly diagnose Intermittent problems with linking, steering, speakers, lamps, the seat shaker, or blower use the Volume Up or Volume Down button to select Burn-in Test at the Diagnostic Menu, then press the Test button. Select the desired test from the Burn-In Test menu.

A Burn-In test cycles non-stop through while dragnosing a problem. If an error is detected the Burn-In Test will stop and an error message will display on-screen.

Inputs from the control buttons are ignored during Burn-In. The Burn-In Test cannot be halted from the menus. To halt the test, switch off power to the game machine and then reboot game machine.

Main Menu
Diagnostic Menu, continued
Verify Software

VERIFY SOFTWARE

To perform software verification use the Volume Up or Volume Down button to select Verify Software at the Diagnostic Menu, then press the Test button.

The test diagnostic will automatically check the software in the span of a few minutes and then report the outcome as pass or fail. Observe screen for test results.

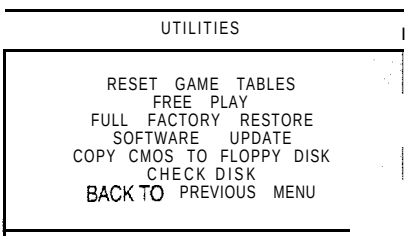
To return to the submenu, press any button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

Main Menu
Utilities

UTILITIES

To make adjustments to a variety of bookkeeping memory banks use the Volume Up or Volume Down button to select Utilities from the Main Menu, then press the Test button.

To select desired Utilities option use the Volume Up or Volume Down, button, then press the Test button

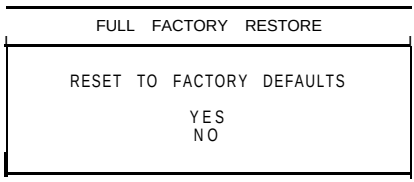


Main Menu
Utilities, continued
Full Factory Restore

FULL FACTORY RESTORE

To return all game variables to the original factory setting use the Volume Up or Volume Down button to select Full Factory Restore from the Utilities screen, then press the Test button.

Use the Volume Up or Volume Down button to select desired answer, then press the Test button to complete selection. Observe a confirmation box appears on-screen to verify a selection was made.



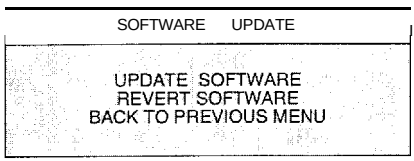
To return to the submenu, select Return and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

Main Menu
Utilities, continued
Software Update

SOFTWARE UPDATE

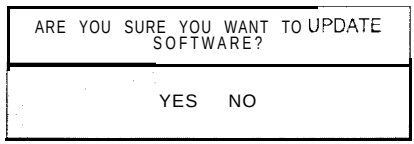
To aid installation of software use the Volume Up or Volume Down button to select Software Update at the Utilities screen, then press the Test button.

This option aids the process of either updating game software to the latest version or reverting to the previous version, if desired. Please note



Either Software Update option offers multiple setting choices in which you must select a value. Use the Volume buttons to change the value setting and observe a confirmation box as shown on the next page appears.

Main Menu
Utilities, continued
Software Update



Press the Volume Up or Volume Down button to select YES or NO, then press the Test button to lock in the setting. Selecting NO cancels any changed values and returns the previous values to memory

Follow on-screen instructions to complete version selection. ***P/ease*** note, software update option exits the game Diagnostic menus.

Main Menu
Utilities, continued
Copy CMOS To Floppy Disk

COPY CMOS TO FLOPPY DISK
To copy the system CMOS file onto a floppy disk use the Volume Up or Volume Down button to select Copy CMOS To Floppy Disk at the Utilities screen, then press the Test button.

Follow on-screen instructions to complete selection. To return to the Main Menu scroll to Back To Previous Menu and press the Test button.

Main Menu
utilities, ***continued***
Check Disk

CHECK DISK
To check integrity of the disk use the Volume Up or Volume Down button to select Check Disk at the Utilities screen, then press the Test button to enter.

Follow on-screen instructions to complete selection. Please ***note,*** this option will cause the game machine to reboot.

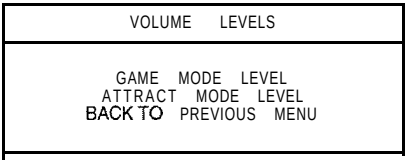
Main Menu

Volume Levels

VOLUME LEVELS

To select a desirable volume level use the Volume Up or Volume Down button to select Volume Level from the Main Menu, then press the Test button.

Remember that the minimum sound level is set by using the Adjustments Menu



Press the Volume Up button to increase sound level or the Volume Down button to decrease the sound level of the game. Press the Test button to lock the volume level at the selected value.

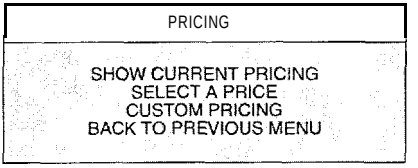
To return to the submenu, select Return and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

Main Menu

Pricing

PRICING

Use Pricing to specify pricing settings other than the ones listed in the Pricing Table. to select the amount of credits required to start a game, and the amount of credits required to continue a game. Use the Volume Up or Volume Down button to select Pricing from the Main Menu, then press the Test button.



Use the Volume Up or Volume Down button to select desired selection, then press the Test button.

To return to the submenu, select Return and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

Main Menu

Pricing Menu, continued

Show Current Pricing

SHOW CURRENT PRICING

Use the Show Current Pricing option to view the pricing options currently selected for game play. Remember pricing is used to select the amount of credits required to start a game, as well as to continue a game.

Press the Test button to return to main pricing menu; to return to the Main Menu scroll to Back To Previous Menu and press the Test button

Main Menu

Pricing Menu, continued

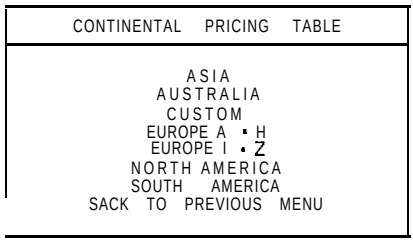
Select a Price

SELECT A PRICE MENU

Use the Select a Price Menu to select preset price settings on a continental, or country by country basis, as outlined in the Pricing Table that follows.

Pricing can also be used to select the amount of credits required to start a game and the amount of credits required to continue a game.

Use the Volume buttons to select country, then press the Test button. Use the Volume buttons to further navigate selections listed within a desired country. Press the Test button to save selection.



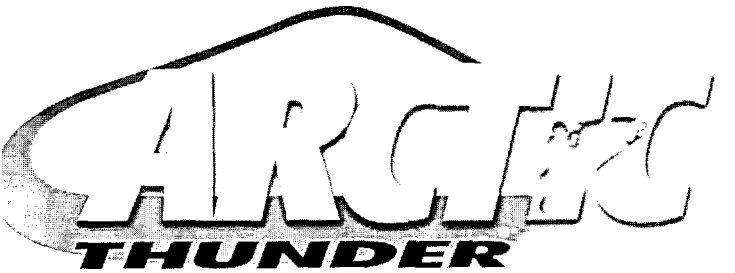
To return to the submenu, select Return and press the Test button; to return to the Main Menu scroll to Back To Previous Menu and press the Test button.

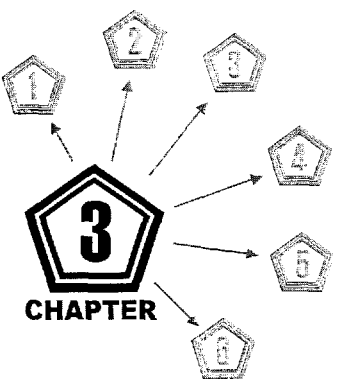
Pricing Table

Use the Pricing Table illustrated below as a guide to select and/or verify the desired coin credit setting(s).

NAME	START	CONTINUE	CREDITS/COIN	COIN 1	/COIN2	COIN 3	COIN4	BILL
ANTILLES	2	2	1/25c, 4/1G	25¢	1G			
AUSTRALIA 1	2	2	1/3X20c, 2/$1.00	20¢	$1.00			
AUSTRALIA 2	1	1	1/5X20c, 1/$1.00	20¢	$1.00			
AUSTRIA 1	2	2	1/5Sch, 2/10Sch	5 Sch	10 Sch			
AUSTRIA 2	2	2	1/2X5Sch, 3/2X10Sch	5 Sch	10 Sch			
BELGIUM 1	2	2	1/20BF	20BF	20BF			
BELGIUM 2	2	2	3/20BF	20BF	20BF			
BELGIUM 3	2	2	2/20BF	20BF	20BF			
BELGIUM ECA	2	2	1/20BF	5BF	20BF	0BF		
CANADA 1	2	2	1 / 2 x 25c, 3 / $1	25¢	25¢			
CANADA 2	2	2	1 / 2 x 25¢, 3 / $1	25¢	$1.00			
CANADA 3	2	2	3 / $1.00, 6 / $2.00	$1.00	$2.00			
CANADA ECA	2	2	1 / 2 x 25c, 3 / $1	25¢		1.00	$2.00	
DENMARK	2	2	3/5DKr, 7/10DKr	5DKr	10DKr			
FINLAND	2	2	1/1Fmk	1Fmk	5Fmk			
FRANCE 1	2	2	2/5Fr, 5/10Fr	5Fr	10Fr			
FRANCE 2	2	1	2/5Fr, 4/10Fr	5Fr	10Fr			
FRANCE 3	2	1	1/5Fr, 3/10Fr	5Fr	10Fr			
FRANCE 4	2	1	1/5Fr, 2/10Fr	5Fr	10Fr			
FRANCE 5	2	1	2/5Fr, 5/10Fr, 11/2 X 10Fr	5Fr	10Fr			
FRANCE 6	2	1	2/5Fr, 4/10Fr, 9/2 X 10Fr	5Fr	10Fr			
FRANCE 7	2	1	1/5Fr, 3/10Fr, 7/2 X 10Fr	5Fr	10Fr			
FRANCE 8	2	1	1/5Fr, 2/10Fr, 5/2 X 10Fr	5Fr	10Fr			
FRANCE 9	2	1	1/3 X 1Fr, 2/5Fr	1Fr	5Fr			
FRANCE 10	2	1	1/2 X 1Fr, 3/5Fr	1Fr	5Fr			
FRANCE 11	2	1	1/3 X 1Fr, 2/5Fr, 5/2 X 5Fr	1Fr	5Fr			
FRANCE 12	2	1	1/2 X 1Fr, 3/5Fr, 7/2 X 5Fr	1Fr	5Fr			
FRANCE ECA 1	1	1	2/5Fr, 5/10Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 2	1	1	2/5Fr, 4/10Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 3	1	1	1/5Fr, 3/10Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 4	1	1	1/5Fr, 2/10Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 5	1	1	2/5Fr, 5/10Fr, 11/20Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 6	1	1	2/5Fr, 4/10Fr, 9/20Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 7	1	1	1/5Fr, 3/10Fr, 7/20Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 8	1	1	1/5Fr, 2/10Fr, 5/20Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 9	1	1	1/3 X 1Fr, 2/5Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 10	1	1	1/2 X 1Fr, 3/5Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 11	1	1	1/3 X 1Fr, 2/5Fr, 5/10Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 12	1	1	1/3 X 1Fr, 2/5Fr, 7/10Fr	1Fr	5Fr	)Fr	20Fr	
FRANCE ECA 13	1	1	1/10Fr, 2/20Fr, 4/30Fr	1Fr	5Fr	)Fr	20Fr	
FREE PLAY	–	–	–	None	None	)ne	None	None
GERMANY 1	2	2	1/1DM, 6/5DM	1DM	5DM			
GERMANY 2	2	1	1/1DM, 7/5DM	1DM	5DM			
GERMANY 3	2	1	1/1DM, 8/5DM	1DM	5DM			
GERMANY 4	2	1	1/1DM, 5/5DM	1DM	5DM			
GERMANY 5	2	1	1/1DM, 6/5DM	1DM	5DM			
GERMANY ECA 1	2	2	1/1DM, 2/2DM, 6/5DM	1DM	2DM	)M		

NAME	START	CONTINUE	CREDITS/COIN	COIN 1	COIN 2	COIN 3	COIN 4	BILL
GERMANY ECA 2	2	1	1 1DM, 2 2DM, 6 5DM	1DM	2DM	5DM		
GERMANY ECA 3	1	1	1 1DM, 2 2DM, 6 5DM	1DM	2DM	5DM		
HUNGARY	2	2	1 2X10Ft, 3 2X20Ft	10Ft	20Ft			
ITALY	2	2	1 500Lit	500Lit	500Lit			
JAPAN 1	2	2	1 100Yen	100 Yen	100 Yen			
JAPAN 2	2	2	2 100Yen	100 Yen	100 Yen			
JAPAN 3	1	1	1 100Yen	100	100			
JAPAN 4	1	1	2 100Yen	100	100			
JAPAN 5	1	1	4 100Yen	100	100			
JAPAN 6	1	1	1 2X100Yen	100	100			
NETHERLANDS	2	2	1 1Fl, 3 2.5Fl	1Fl	2.5Fl			
NEW ZEALAND 1	1	1	1 $1	$1	$2			
NEW ZEALAND 2	1	1	2 $1	$1	$2			
NORWAY	2	2	3 5Nkr, 6 10Nkr	5Nkr	10Nkr			
SPAIN 1	2	2	1 100Pta, 6 500Pta	100Pta	500Pta			
SPAIN 2	2	2	1 100Pta, 5 500Pta	100Pta	500Pta			
SWEDEN	2	2	1 3X1Skr, 2 5Skr	1Skr	5Skr			
SWITZERLAND 1	2	2	1 1SFr, 6 5SFr	1SFr	5SFr			
SWITZERLAND 2	2	2	1 1SFr, 7 5SFr	1SFr	5SFr			
SWITZERLAND 3	2	2	1 1SFr, 8 5SFr	1SFr	5SFr			
UK ECA 1	1	1	1 50p, 3 $1.00, 6 $2.00	$1.00	50p	0p	10p	£2.00
UK ECA 2	1	1	1 50p, 2 $1.00, 4 $2.00	$1.00	50p	0p	10p	£2.00
UK ECA 3	1	1	1 50p, 2 50p, 5 $1.00	$1.00	50p	0p	10p	£2.00
UK 4	1	1	1 50p, 3 $1.00	$1.00	50p			
UK 5	1	1	1 50p, 2 $1.00	$1.00	50p			
UK ECA 6	1	1	1 50p, 2 50p, 4 $1.00	$1.00	50p	0p	10p	£2.00
UK ECA 7	1	1	3 $1.00	$1.00	50p	0p	10p	£2.00
UK ECA 8	1	1	1 50p, 2 $1.00, 4 $2.00	$1.00	50p	0p	10p	£2.00
USA1	2	2	1/25c	25c	25c			$1.00
USA2	2	1	1/25c	25c	25c			$1.00
USA3	1	1	1/25c	25c	25c			$1.00
USA4	1	1	1/50c, 3/$1.00	25c	25c			$1.00
USA5	2	1	1/50c, 4/$1.00	25c	25c			$1.00
USA6	1	1	1/50c	25c	25c			$1.00
USA7	1	1	1/50c, 3/$1.00	25c	25c			$1.00
USA8	2	2	1/50c	25c	25c			$1.00
USA9	3	2	1/25c	25c	25c			$1.00
USA10	3	3	1/25c	25c	25c			$1.00
USA11	4	2	1/25c	25c	25c			$1.00
USA12	4	3	1/25c	25c	25c			$1.00
USA13	4	4	1/25c	25c	25c			$1.00
USA ECA	2	2	1/25c, 4/$1.00	$1.00	25c	10c	05c	$1.00
USA DC 1	2	2	1/25c	25c	$1.00			$1.00
USA DC 2	2	1	1/25c	25c	$1.00			$1.00
USA DC 3	1	1	1/25c	25c	$1.00			$1.00
USA DC 4	3	2	1/25c	25c	$1.00			$1.00
USA DC 5	3	3	1/25c	25c	$1.00			$1.00
USA DC 6	4	2	1/25c	25c	$1.00			$1.00
USA DC 7	4	3	1/25c	25c	$1.00			$1.00
USA DC 8	4	4	1/25c	25c	$1.00			$1.00





SERVICE

SAFETY INSTRUCTIONS

The following safety instructions apply to operators and service personnel. Read these instructions thoroughly prior to servicing or preparing the game machine for play. Other safety instructions appear throughout this manual where necessary.

DEFINITIONS OF SAFETY TERMS

- DANGER indicates an imminent hazard. If you fail to avoid this hazard, it WILL cause death or serious injury.
- WARNING Indicates a potential hazard. If you fail to avoid this hazard, it COULD cause death or serious injury
- CAUTION indicates a potential hazard. If you fail to avoid this hazard, it MAY cause minor or moderate Injury. CAUTION also alerts you about unsafe practices.
- NOTE indicates information of special importance.

	WARNING: TRANSPORTING GAMES. The game machine contains glass and fragile electronic devices. Use approprrate care when transporting to avoid rough handling of cabinet. Never move with power switched on.
	WARNING: DISCONNECT POWER. Always turn power OFF and unplug game machine before attempting service or adjustments unless otherwise instructed. Installing or repairing boards with power switched on can damage components and void the warranty.
	WARNING: GROUND GAMES. Avoid electrical shocks! Do not plug in a VGM until you have inspected and properly grounded it. Only plug this game into a grounded, three-wire outlet. Do not use a “cheater” plug, or cut off ground pin on line cord.
	WARNING: AVOID ELECTRICAL SHOCKS. The game machine system does not utilize an isolation transformer. Internal cabinet AC is not isolated from external AC line.
	WARNING: HANDLE FLUORESCENT TUBE AND CRT WITH CARE. If you drop a fluorescent tube or CRT and it breaks, it will implode! Shattered glass can fly eight feet or more from implosion.

CAUTION: CHECK POWER SELECTOR, LAMP.
Set the 115/230VAC selector on the power supply for the correct line voltage. Check the selector setting before switching on game machine. Verify fluorescent lamp assembly is correct for the local line voltage.

CAUTION: USE PROPER FUSE.
Avoid electrical shock! Replacement fuses must be identically rated. Fuse voltage and current ratings must be identically rated to original fuse.

CAUTION: ATTACH CONNECTORS PROPERLY.
Be sure board connectors mate properly. If connectors do not slip on easily, do not force them. A reversed connector may damage the game machine and void the warranty. Connector keys only allow a connector to fit one set of pins on a board.

CAUTION: USE CARE WHEN SHIPPING HARD DISKS.
The hard disk drive (HDD) must be packed in an anti-static bag. When shipping HDD for repair or replacement, pack it in an approved container (P/N 08-8068). Do not stack or drop hard disk drives.

WARNING: HAZARD TO EPILEPTICS.
A very small portion of the population has a condition which may cause them to experience epileptic seizures or have momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are present in our daily environment. These persons may experience seizures while watching some kinds of television pictures or playing certain video games. People who have not had any previous seizures may nonetheless have an undetected epileptic condition.

If you or anyone in your family has experienced sympfoms linked to an epileptic condition (e.g., seizures or loss of awareness), immediately consult your physician before using any video games.

We recommend that parents observe their children while they play video games. If you or your child experience the following symptoms: dizziness, altered vision, eye or muscle twitching, involuntary movements, loss of awareness, disorientation, or convulsions, DISCONTINUE USE IMMEDIATELY and consult your physician.

SERVICING

Only qualified service personnel should Perform maintenance and repairs. product guidelines apply to all operators and service personnel.

See the notice and warnings appear throughout the manual where they apply. We recommend that you thoroughly read the SAFETY NOTICES section prior to beginning service. **NOTE:** *Always switch off power to the pinball machine before servicing.*

To service Marquee...

Refer to *Marquee Service* and *General Dash Service* illustrations.

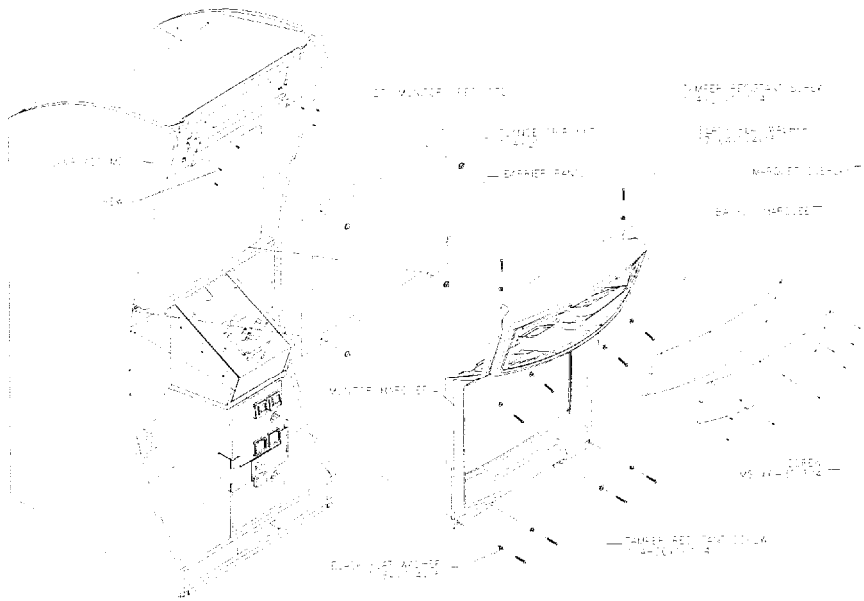
- Switch off power to game machine and unplug AC line cord.
- *Remove controller assembly:*
  - Remove tamper resistant screws used to fasten controller cover to controller housing and set aside
  - Lift up controller cover enough *to expose* wiring.
  - Label and disconnect all wiring, including ground
  - Completely remove controller cover and set aside until reinstallation,
  - Locate and remove center hub. Remove screws from hub, lift hub from shaft, then set aside until reinstallation
  - Locate and remove the hex nut used to fasten controller housing to motor shaft.
  - Grasp each controller grip and lift up and away from dashboard. *If controller housing sticks, perform step 8 as described below, otherwise advance to step 8.*
  - Replace the hub removed in step 5. Fasten in place with the screws provided.
  - Locate hex head bolt. This bolt is secured with a retention clip inside of the controller assembly
  - Insert bolt in hub and tighten down until the controller housing begins to lift up and can be removed completely
  - Be sure to return bolt to retention clip for future use
  - Locate and remove Phillips head screws used to fasten anti-pinch plate around motor shaft.
  - Remove anti-pinch plate and set aside with hardware until reinstallation,
- *Remove Pod:*
  - Locate and remove tamper-resistant *screws used* to fasten pod to cabinet.
  - Open pod and away from cabinet.
  - Place pod in a safe place along with hardware to prevent breakage or loss.
- *Remove Marquee:*
  - Locate and remove tamper-resistant screws used to fasten marquee to cabinet,
  - Open pod to expose cabinet to expose opening in cabinet. Store marquee in a safe place along with hardware to prevent breakage 0: loss.
- Refer to parts list for replacement or equipment replacement,

WARNING
Fluorescent tubes implode on impact when dropped. Use care in handling.

To service *the Fluorescent Light Assembly...*

Refer to *Marquee Service* illustration.

- Switch off power to game machine and unplug the AC line cord.
- Remove screws used to fasten the clear plastic overlay and marquee artwork to marquee.
- Remove both the marquee overlay and artwork and set aside in a safe place to prevent damage.
- Reach up inside the opening in cabinet and disconnect the power cable from fluorescent light assembly.
- Loosen, but do not remove the screws fastening assembly to cabinet.
- Slide assembly slightly forward to disengage the keyholes. Lift out the assembly.
- Perform desired repair or equipment replacement.



MARQUEE ILLUSTRATION

To service Barrier Panel.. .

Refer to *Marquee* Service illustration.

. Switch off power to game machine and unplug AC line cord.

- Remove Marquee. *Refer to service instructions for Marquee*
- Locate and remove hex nuts used to fasten barrier panel in cabinet. Grasp barrier panel along bottom edge and lift it out of cabinet.
- Perform desired repair or equipment replacement

BLOWER SERVICE

To service Blo wer *Fan.. .*

Refer to *Blower Fan and Speaker Service* illustration

- Switch off power to game machine and unplug AC line cord
- *Remove access panel from atop cabinet*

  1 .Locate and remove screws used to fasten access panel to cabinet

  2.Lift and pivot panel to remove from cabinet. NOTE: This panel is heavy, and may require a bit of maneuvering during removal and reinstallation.

- Label and disconnect wiring
- Remove hex nuts and washers from mounting screws before removing fan assembly from enclosure Set aside hardware. Lift out fan assembly.
- Perform desired repair or equipment replacement.
- Be sure to clean fan filter, or replace with new one, before reinstallation of blower fan

To service Marquee Mounted Cabinet Speakers.. .

Refer to Blower Fan and *Speaker Service* illustration. Speakers are located in the underside of marquee.

- Switch off power to game machine and unplug AC line cord.
- *Remove fan access panel from atop cabinet*

  1 .Locate and remove screws used to fasten access panel.

  2 Lift and pivot panel to remove from cabinet. NOTE: Access panel is heavy and may require a b : of maneuvering during removal and reinstallation.
- Label and disconnect speaker wiring, including ground strap.
- Remove hex nuts from mounting screws before removing speakers from enclosure
- Perform desired repair or equipment replacement.
- Carefully reseat seals upon completing any task inside speaker enclosure.
- Reconnect wires, including ground. Refer to the Cabinet Wiring Diagram for correct speaker polarity

NOTE:The speakers are magnetically shielded to prevent video monitor color impurity. Be sure that any replacement speakers are also magnetically shielded.

To service Controller.. .

Refer to *Controller* Service illustration

- Switch off power to game machine and unplug AC line cord
- Open rear cabinet door.
- Label and disconnect all dash wiring including ground strap.
- *Remove controller assembly*

  1. Remove tamper-resistant screws used to fasten controller cover to controller housing and set aside.

  2. Lift up controller cover enough to expose wiring.

  3. Label and disconnect all wiring, including ground.

  4. Completely remove controller cover and set aside until reinstallation.

  5.Locate and remove center hub. Remove screws from hub, lift hub from shaft, then set aside until reinstallation.

  6.Locate and remove jam nut and lock washer used to fasten controller housing to motor shaft.

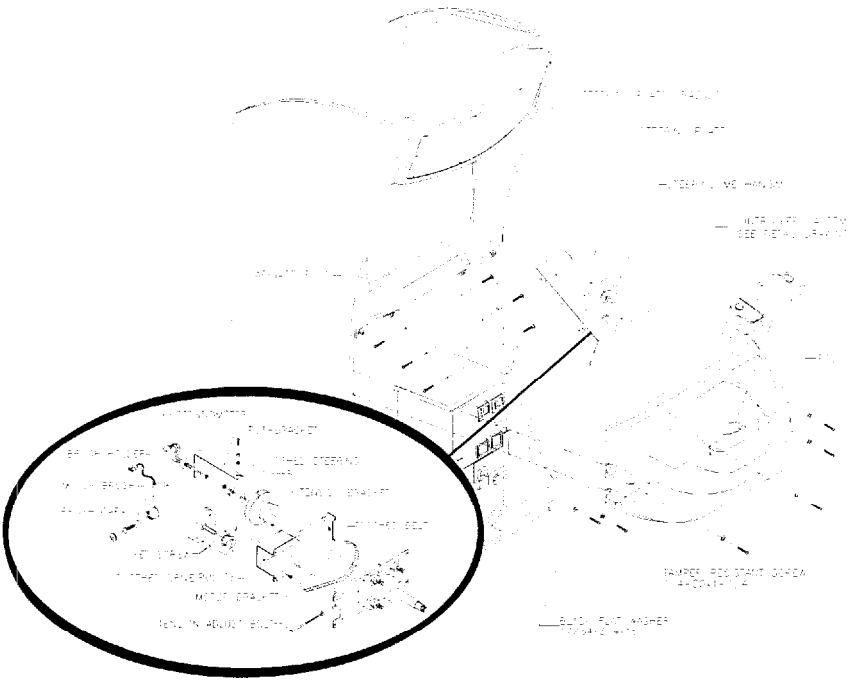
  7. Grab each controller grip and lift up and away from dashboard. *If* controller *housing sticks,* perform *bulleted steps listed below, otherwise advance to step 8.*

  - Replace the hub removed in step 5. Fasten in place with the screws provided.
  - Locate hex-head bolt. This bolt is secured with a retention clip inside of the controller assembly.
  - Insert bolt in hub and tighten down until the controller housing begins to lift up and can be removed completely.
  - Be sure to return bolt *to* retention clip for future use.

  8.Set aside controller housing with matching hardware until reinstallation.
- Perform desired repair or equipment replacement

To service Start and Attack Buttons...

- Switch off power to game machine and unplug AC line cord
- *Remove* controller *assembly*
  1. Remove tamper-resistant screws used to fasten controller cover to housing and set aside.
  2. Lift up controller cover enough to expose wiring. Label and disconnect all wiring, including ground.
  3. Completely remove controller cover.
- Perform desired repair or equipment replacement.



GENERAL DASH SERVICE

To service Throttle.. .

Refer to *Controller Service* illustration.

- Switch off power to game machine and unplug AC line cord.
- Open rear cabinet door
- Label and disconnect all dash wiring, including ground strap.
- *Remove controller* assembly
  1. Remove tamper-resistant screws used to fasten controller cover to housing and set aside

To service Throttle (continued)...

2. Lift up controller cover enough to expose wiring. Label and disconnect all wiring, including ground

3. Completely remove controller cover and set aside until reinstallation.

- Perform desired repair or equipment replacement.
- Reconnect wires and reinstall. Check for pinched wires

To service Steering Assembly.. .

- Switch off power to game machine and unplug AC line cord.
- Unlock and open rear cabinet door.
- Label and disconnect wiring, including ground strap, for steering assembly.
- *Remove* controller *assembly*

1. Remove tamper-resistant screws used to fasten controller cover to the housing and set aside

2. Lift up controller cover enough to expose wiring.

3. Label and disconnect all wiring, including ground

4. Completely remove controller cover and set aside until reinstallation.

5. Locate and remove center hub. Remove screws from hub, lift hub from shaft, then set aside until reinstallation.

6. Locate and remove jam nut and lock washer used to fasten controller housing to motor shaft.

7. Grab each controller grip and lift up and away from dashboard. *If controller housing sticks. perform bulleted steps listed below, otherwise advance* to *step 8.*

- Replace the hub removed in step 5. Fasten in place with the screws provided.
- Locate hex-head bolt. This bolt is secured with a retention clip inside of the controller assembly
- Insert bolt in hub and tighten down until the controller housing begins to lift up and can be removed completely.
- Be sure to return bolt to retention clip for future use.

8. *Set* aside controller housing with matching hardware until reinstallation.

9. Locate and remove Phillips head screws used to fasten the anti-pinch plate around motor shaft.

10. Remove anti-pinch plate and set aside with hardware until reinstallation.

- Remove *dash pod*:

1. Locate and remove tamper-resistant screws used to fasten pod to cabinet

2. Gently slide dash pod off of and away from cabinet.

3. Place pod in a safe place along with hardware to prevent breakage or loss

- Remove hex nuts used to fasten dash plate to cabinet.
- Pull plate forward to expose motor. Lift out steering assembly. NOTE: Use caution when removing motor due to its weight.
- Perform desired repair or equipment replacement

DANGER
High voltage present. Exercise extreme caution while servicing transformer.

To service Transformer.. .

- Switch off power to game machine and unplug AC line cord
- Unlock and remove rear door.
- If power to game machine was only recently disconnected, the transformer may still be warm. Allow transformer to cool completely before handling.
- Label and disconnect all wiring, including ground.
- Remove screws used to fasten transformer to base of cabinet
- Perform desrred repair or equipment replacement.

To service Coin Mechanism.. .

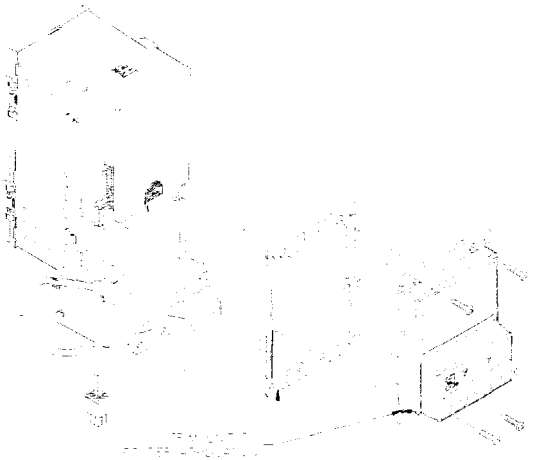
- Switch off power to game machine and unplug the AC line cord
- Unlock coin door and swing it open.
- Unlatch and remove each coin mechanism separately to clean or replace with a different type. Ensure mechanism seats fully in the holder upon reinstallation.
- Close and lock the release latch, then close the door.
- Switch on power to game and change the mechanism setup. then test known good and bad coins to verify 'operation

To service Coin Counter...

- Switch off power to game machine and unplug the AC line cord
- Unlock and open cash door.
- Locate meter in lower left corner of the vault opening. Record meter count before testing or replacement.
- Locate meter wires. Label and disconnect wiring.
- Remove screws from front bracket.
- Perform the desrred repair or equipment replacement. NOTE: Be sure replacement meter has a diode across the terminals to protect driver circuits.

To service Coin Meter.. .

- Switch off power to game machine and unplug the AC line cord.
- Unlock and open cash door. Remove cash tubs
- The meter is located at the bottom of vault on a plate. Remove the screws and lift the plate just enough to disconnect the meter wires from the harness.
- Record meter count before testing or replacement.
- Perform desired repair or equipment replacement.



DOLLAR BILL VALIDATOR SERVICE

To service Dollar Bill Validator...

(Use MARS AE2411 -U3 UL recognized currency changer)

Dollar bill validators or other currency acceptors may be installed in games that are manufactured with an additional wiring connector.

- Switch off power to game machine and unplug the AC line cord.
- Unlock and open coin door. Read label affixed to the inside of door for additional information
- Disassemble validator and remove material to permit it to fit inside coin door as shown in *Dollar Bill I/a/i-d&or Service* illustration, then reassemble unit.

To service Shaker Motor Assembly in Seat...

Refer to Seat Service illustration.

- Switch off power to game machine and unplug AC line cord.
- Remove tamper resistant screws used to fasten seat access panel and pull panel forward
- Label and disconnect wiring, including ground.
- Remove hex nuts used to fasten shaker motor to seat and remove
- Perform desired repair or equipment replacement.
- Reinstall motor and reattach wiring.

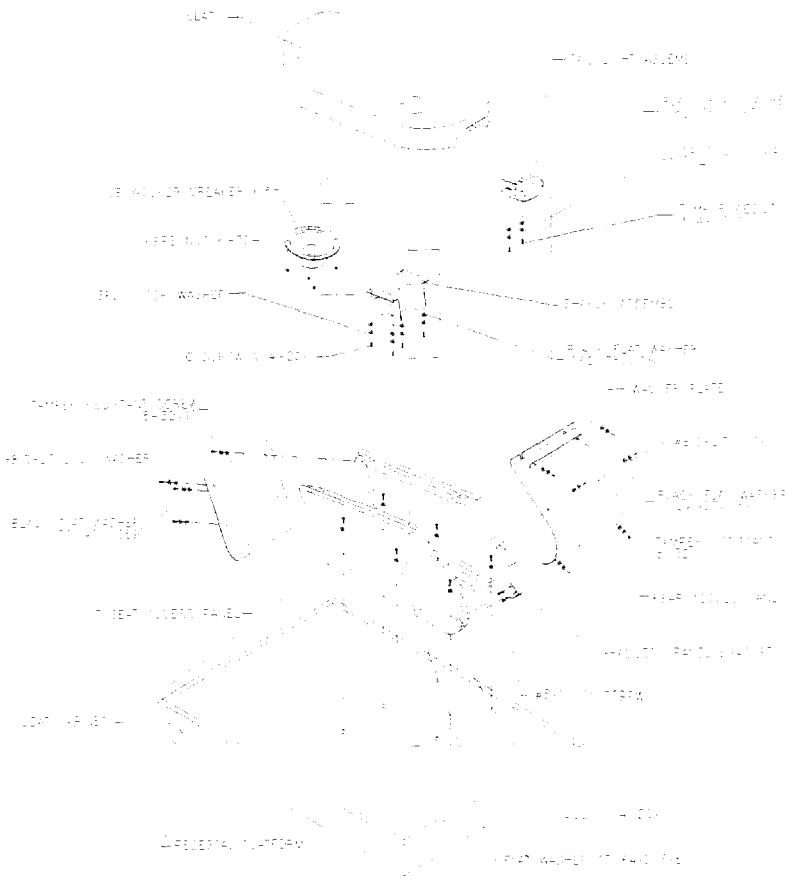
IMPORTANT: Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque each bolt to 20 to 25 in-lbs (177 Nm to 221.25 Nm) if it was loosened.

To service Speaker in Seat...

Refer to Sear *Service* illustration.

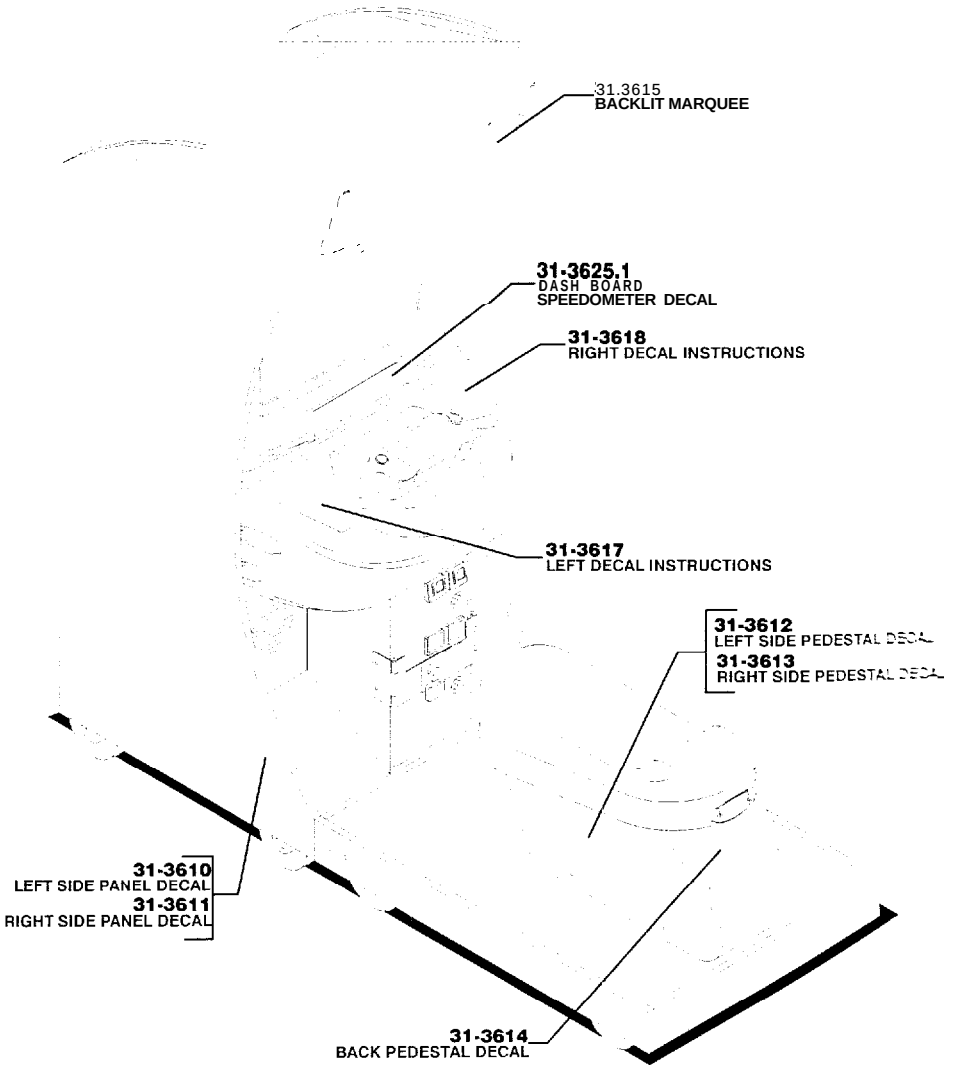
- Switch off power to game machine and unplug AC line cord.
- Remove tamper resistant screws used to fasten seat access panel, and pull panel forward.
- Label and disconnect speaker wiring, including ground.
- Remove her nuts used to fasten speaker to seat and remove speaker.
- Perform desired repair or equipment replacement.
- Reinstall speaker and reattach wiring, including ground.

IMPORTANT: Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) to torque each bolt to five to seven in-lbs (44.25 Nm to 62 Nm) if it was loosened.

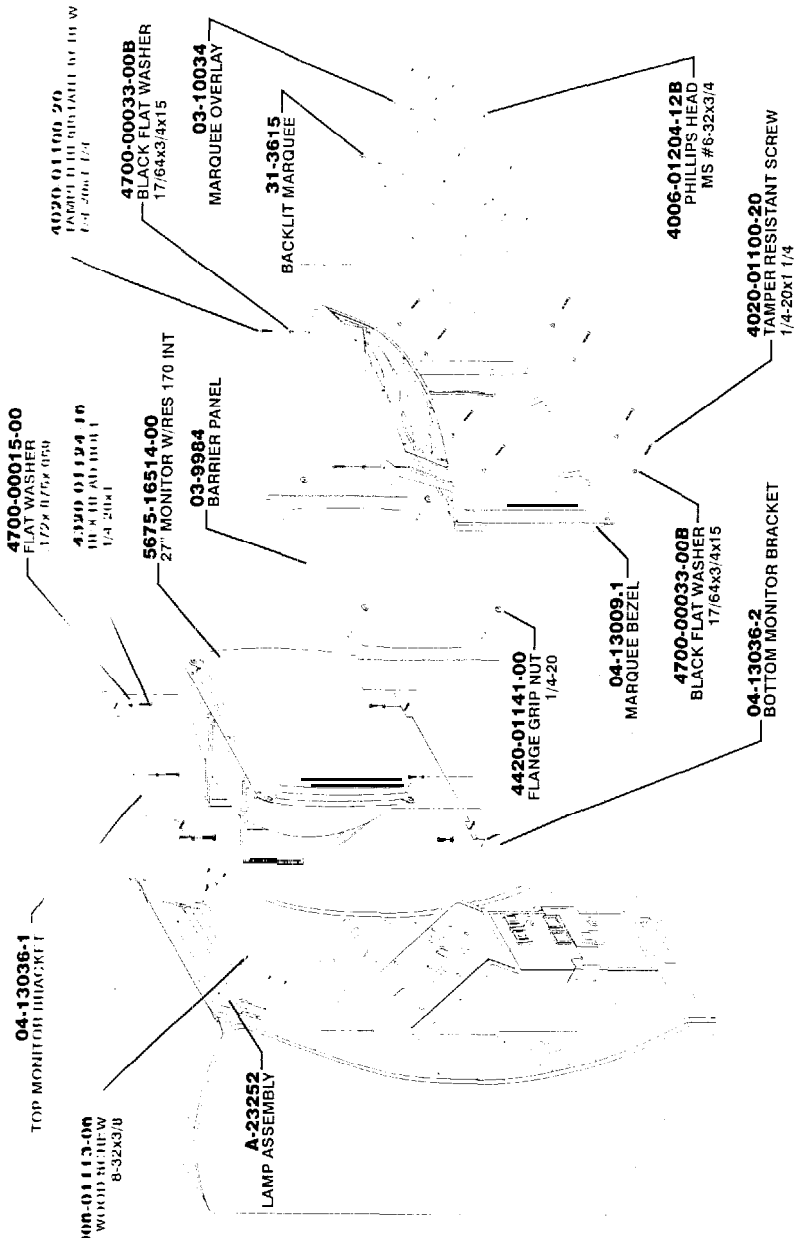


SEAT SERVICE

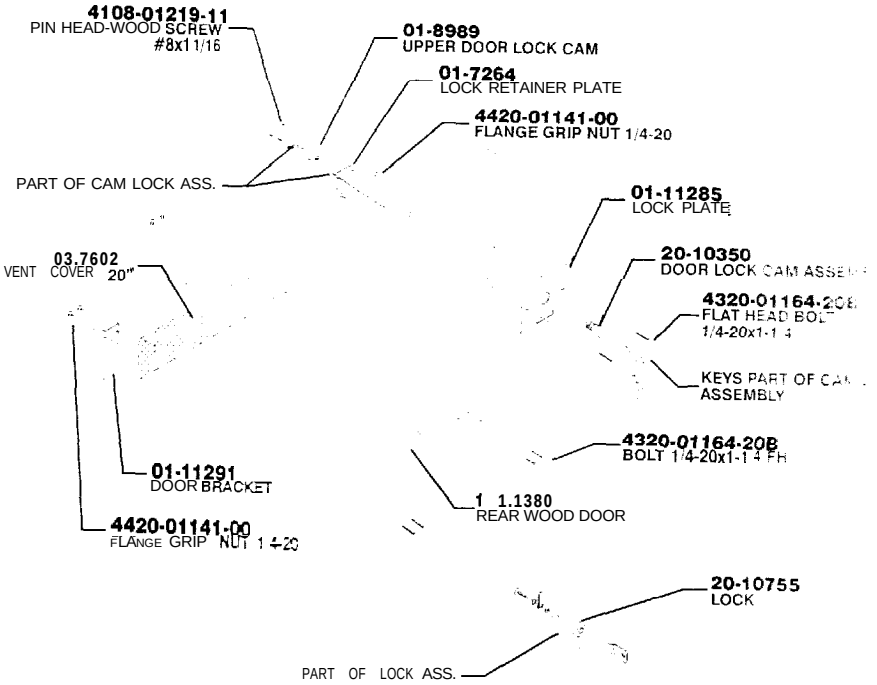
CABINET DECALS



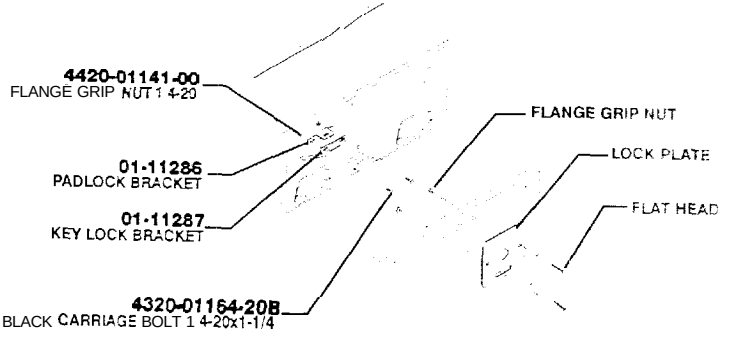
MONITOR MOUNTING



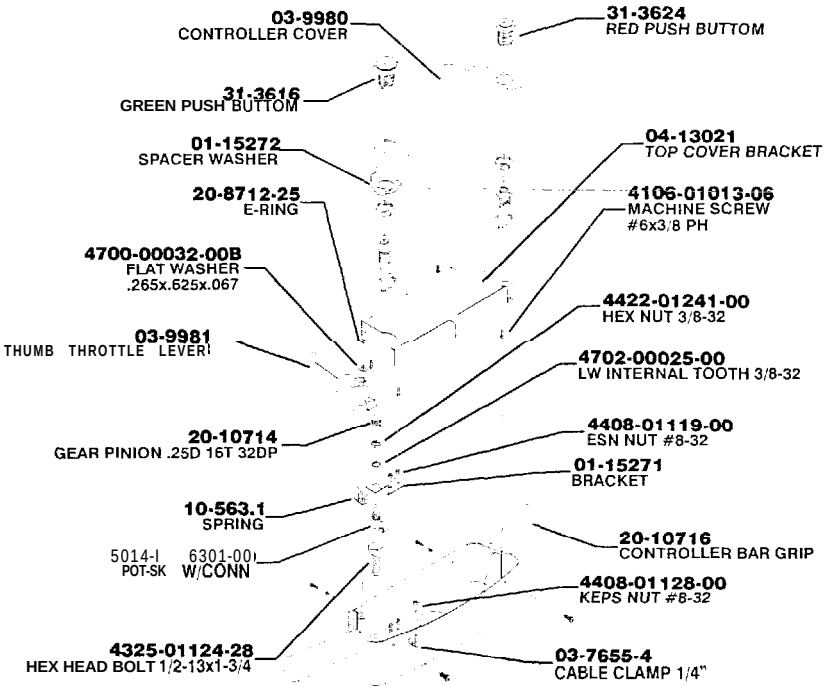
REAR DOOR ASSEMBLY (A-23817)



REAR DOOR LOCK ASSEMBLY

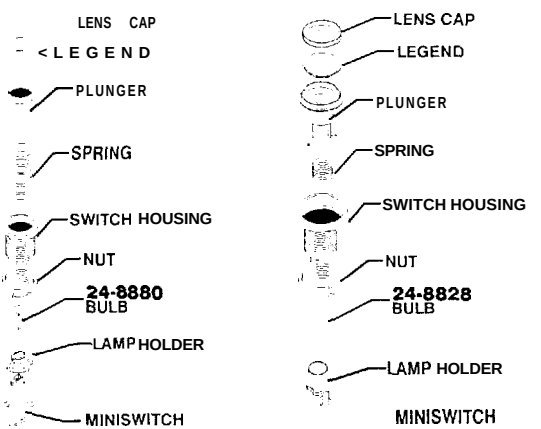


CONTROLLER AND COVER ASSEMBLIES

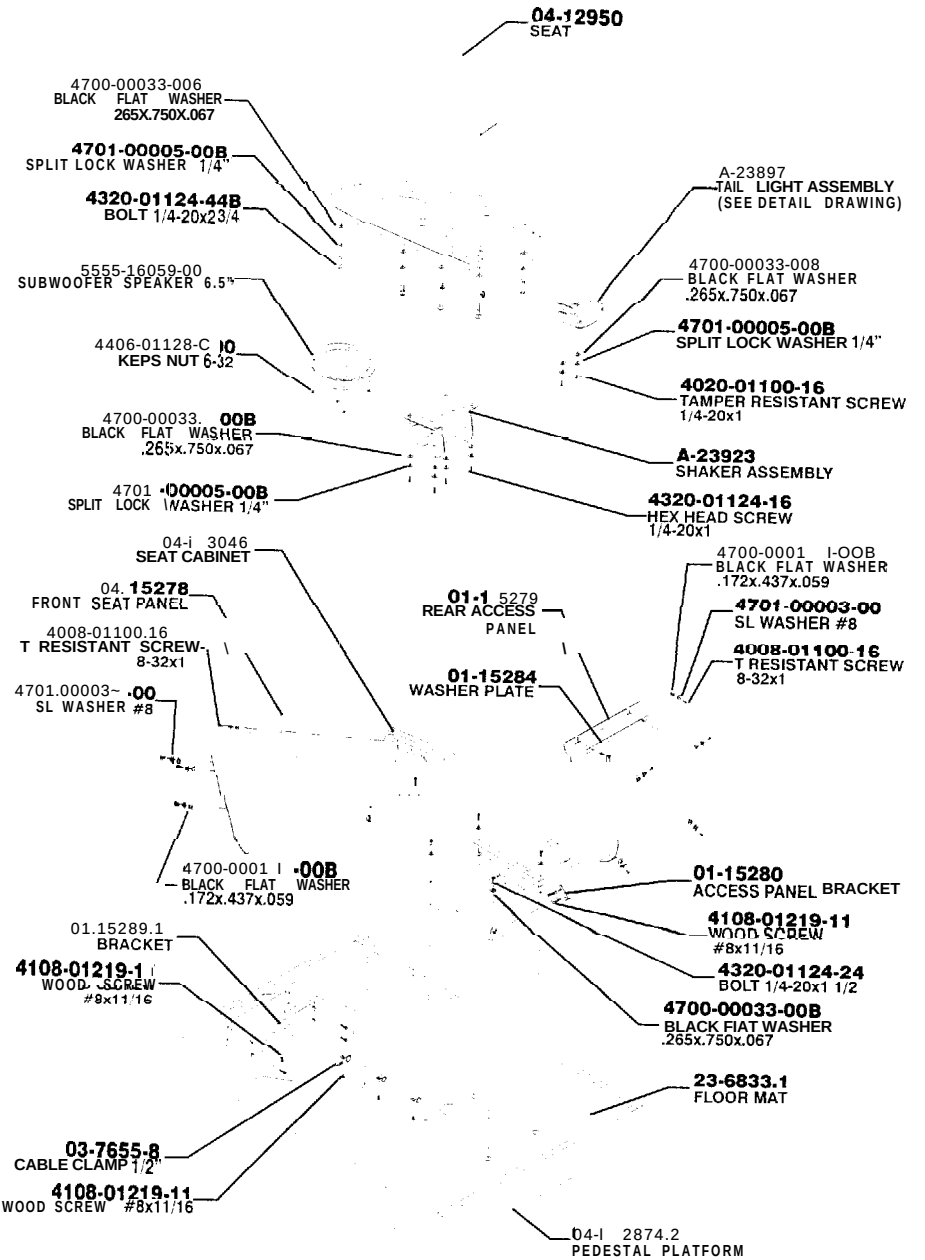


PUSHBUTTONS ASSEMBLIES

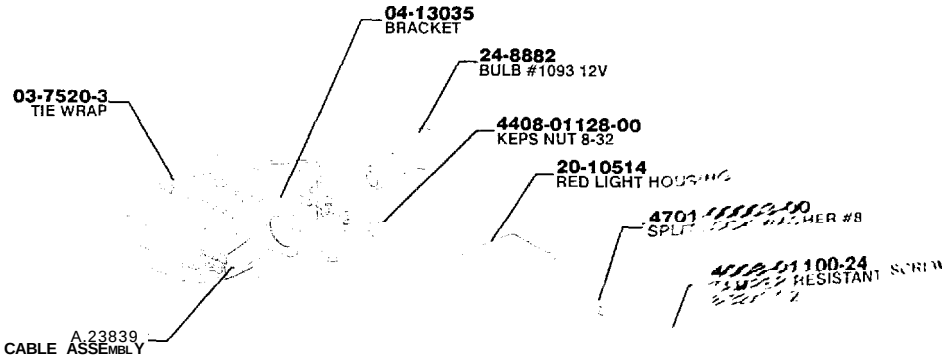
31.3624 (ACTION) **RED** 31-3616 (START) GREEN



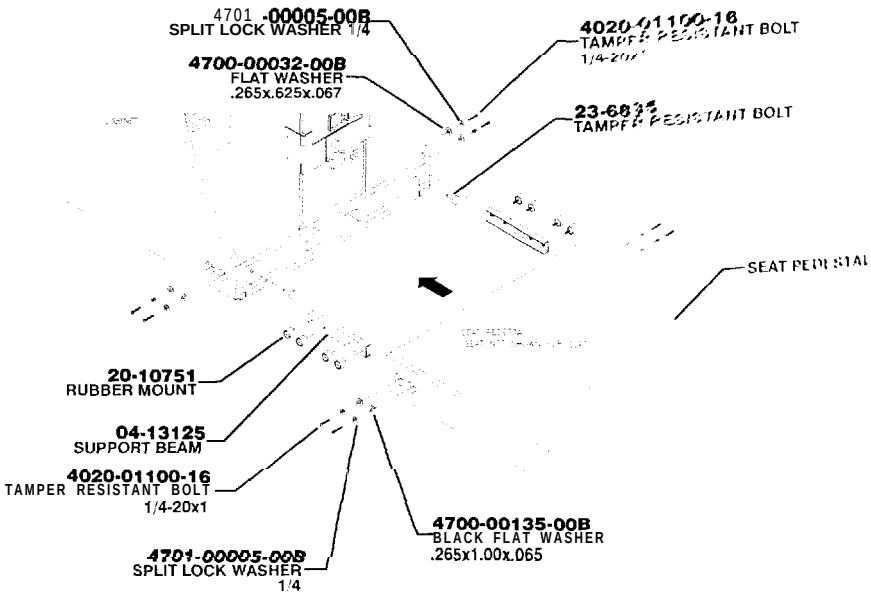
SEAT AND PEDESTAL ASSEMBLY A-23775



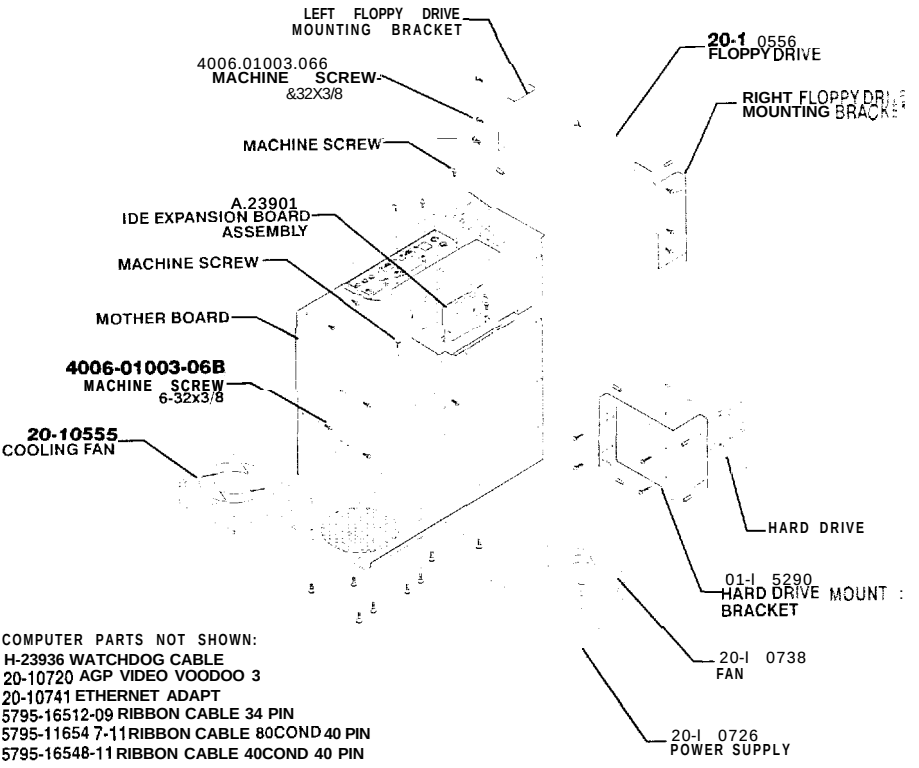
TAIL LIGHT ASSEMBLY (A-23897)



SUPPORT BEAM ASSEMBLY

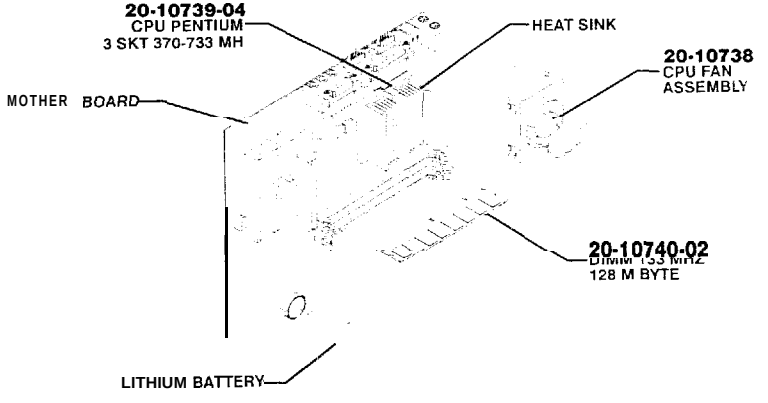


COMPUTER ASSEMBLY A-2381 8

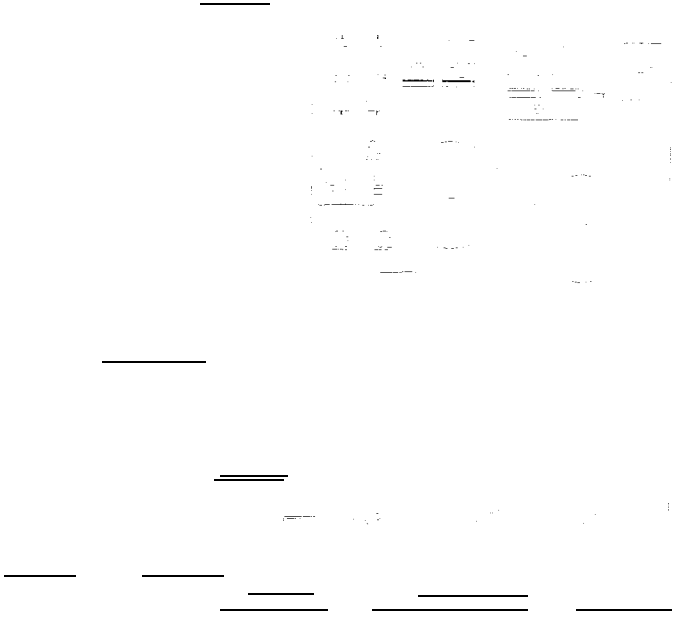


COMPUTER PARTS NOT SHOWN:
H-23936 WATCHDOG CABLE
20-10720 AGP VIDEO VOODOO 3
20-10741 ETHERNET ADAPT
5795-16512-09 RIBBON CABLE 34 PIN
5795-11654 7-11 RIBBON CABLE 80COND 40 PIN
5795-16548-11 RIBBON CABLE 40COND 40 PIN

ARCTIC MOTHER BOARD



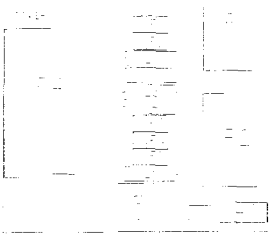
WHEEL DRIVER BOARD ASSEMBLY 04-12770.1



Field Replaceable Parts

DESIGNATION	PART NUMBER	FUNCTION	DESCRIPTION
Q1	5162-08976-00	Darlington	2N6427
Q2	5250-I 5624-00	Voltage regulator	78L15
Q3	5250-15625-00	Voltage regulator	79L15
D2, D3	5070-I 6272-00	Diode	Fast Fe6B-35ns
D5	5070-15115-00	Diode	MUR1605
F1, F2	5731-I 4094-00	Fuse	4ASB, 125V, 5x20mm
F3	5731-15627-00	Fuse	.63A FB
U5	5370-14069-00	Driver Power	LM12 Op Amplifier
BR1	5100-13945-01	Rectifier Bridge	100V, 6A, SIP
U1, U2	5370-12602-00	Pre-Driver	ULN2064B IC

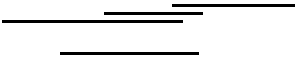
POWER HYDRO FILTER BOARD ASSEMBLY 04-12651-I



Field Replaceable Parts

DESIGNATION	PART NUMBER	FUNCTION	DESCRIPTION
FI through F5	5060-I 5633-00	EMI Filter	2200 pF Dual Capacitor
LI through L5	5556-14181-00	EMI Filter	Ferrite Bead Inductor

IDE EXPANSION FILTER BOARD 04-12826



No Field Replaceable Parts

QUAD HIGH CURRENT DRIVER BOARD 04-13068.2

Field Replaceable Parts

DESIGNATION	PART NUMBER	FUNCTION	DESCRIPTION
Q3, Q6,Q12	5191-12179-00	Transistor	TIP 36C
Q2, Q5,Q11	5162-12635-00	Transistor	TIP 102
D1,D2,D3,D4,D7,D8	5070-09054-00	Diode	1N4004
F1	5731-16560-00	Fuse	10A 250V 5x20MM
F2	5731-14046-00	Fuse	5A 250V 5x20MM
F4	5735-13853-00	Fuse	2A 250V 5X20MM
BR1, BR2	5100-09690-00	Retifier Bridge	35A RECT200V

LINE CORD APPLICATION CHART

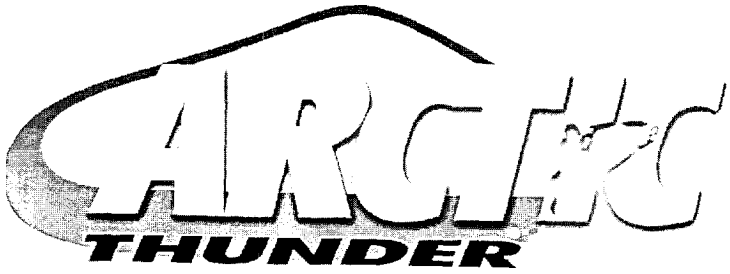
Country \ Part No.	5850-14699-00	5850-14699-01	5850-14699-02	5850-14699-03	585014699-06
USA		•			
UK				•	
Italy	•				
Japan					•
New Zealand					
Germany			•		
Spain			•		
Denmark					
Finland					
Holland					
Norway					
Switzerland					
Hungary					
Canada					
Austria					
France			•		
Australia					
Belgium					
Sweden					

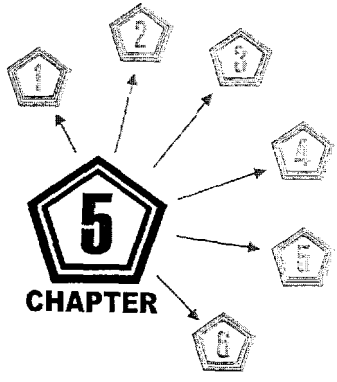
COIN DOOR APPLICATION CHART

Country \ Part No.	09-96026-14	09-96026-20	09-96026-33	09-96027
USA			•	
UK				•
Italy	•			
Japan				•
New Zealand				
Germany				•
Spain		•		
Denmark				
Finland				
Holland				
Norway				
Switzerland				
Hungary				
Canada				
Austria				
France				•
Australia				
Belgium				
Sweden				

TRANSFORMER APPLICATION CHART

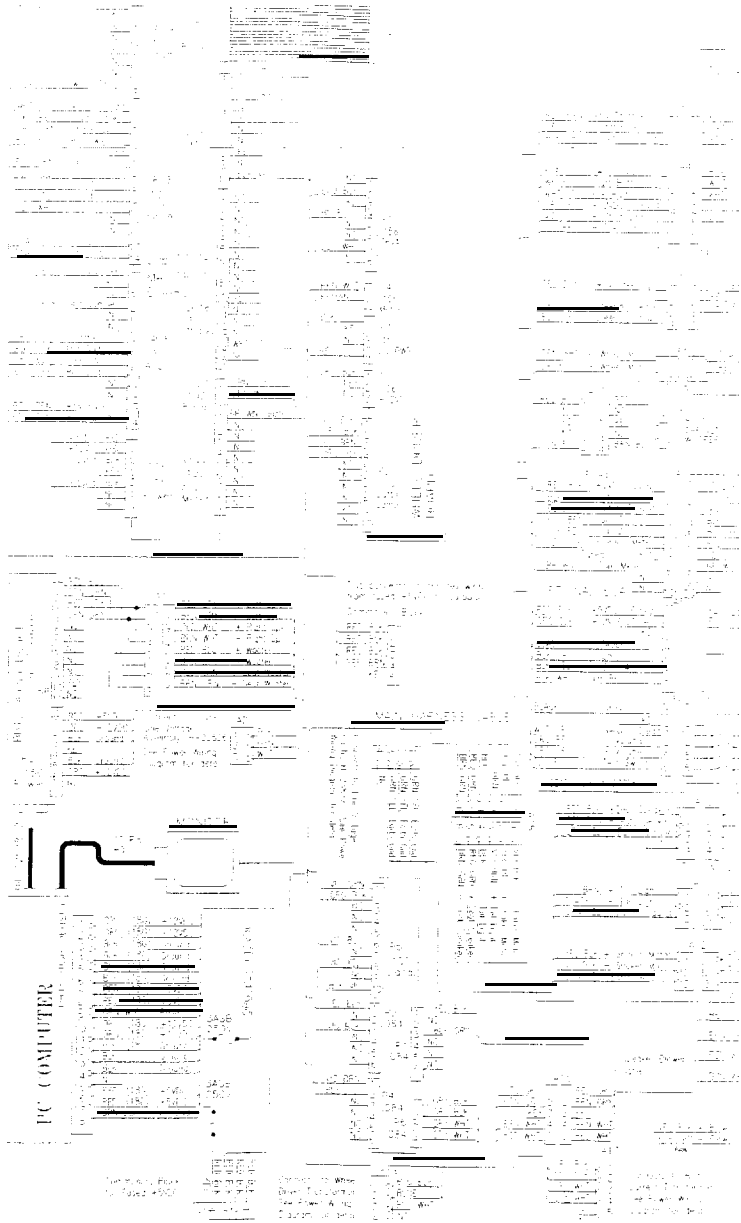
Part number / Voltage & Country	5610-16292-00	5610-16293-00	5610-16294-00	5610-16520-00	5610-16521-00
230 VAC Australia					
230 VAC Austria					
230 VAC Belgium					
230 VAC Canada					
230 VAC Denmark					
230 VAC Finland					
230 VAC France		•			•
230 VAC Germany		•			•
230 VAC Holland					
230 VAC Hungary					
230 VAC Italy		.			.
100 VAC Japan			.		
110 VAC Japan				.	
230 VAC New Zealand					
230 VAC Norway			,		
230 VAC Spain		.			.
230 VAC Switzerland					
230 VAC Uk		.			.
120 VAC United States	.				
110 VAC United States				.	





WIRING

Main Cabinet Wiring



SUBSTITUTE BOARD LED INDICATOR STATUS TABLE

Designation	Location	Function	Color	State	Meaning
D 28	Near fuse F2 & JP15 connector	Indicator	Red	OFF ON BLINKING	No +5V +5V Present Intermittent +12V
D 25	Near fuse F1	Indicator	Red	OFF ON BLINKING	No +12V +12V Present intermittent +12V
D 24	Near U5	Indicator	Red	OFF ON BLINKING	Not in use Communication error Normal operation
D 23	Near U5	Indicator	Red	OFF ON BLINKING	Not in use EEPROM Not Responding Normal operation
D 22	Near U5	Indicator	Red	OFF ON BLINKING	Not in use Security error Normal operation
D 21	Near U5	Indicator	Red	OFF ON BLINKING	Not in use Board reset Normal operation
D 17	Near U5	Indicator	Green	OFF ON BLINKING	Faulty Board Faulty Board Normal operation
D 18	Near U5	Indicator	Green	OFF ON BLINKING	Not in use Faulty Board Normal operation
D 14	Near U5	Indicator	Green	OFF ON BLINKING	Not in use Faulty Board Normal operation
D 20	Near U5	Indicator	Green	OFF ON BLINKING	Not in use Faulty Board Normal operation
D 26	Near JP9	Indicator	Red	OFF ON BLINKING	No power +5V present Intermittent power

AUDIO AMPLIFIER LED INDICATOR TABLE

Designation	Location	Function	Color	State	Meaning
LED 1 (CR1)	Upper Center Nearest C3	Fault Indicator	Red	Off	Normal Operation
				On	Locked-Up (note 1)
				Blinking	Overload (note 2)
LED 2 (CR2)	Lower Center Near U2 & U6	Fault Indicator	Red	Off	Normal Operation
				On	Locked-Up (note 1)
				Blinking	Overload (note 2)

Notes:

1. Active output protection circuit. To reset circuit, clear fault and switch off power.
2. Blinking caused by either intermittent audio overload or overheating. LED is only supposed to blink during start-up.

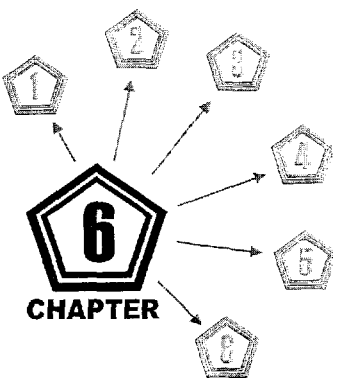
WHEEL DRIVER LED INDICATOR TABLE

Designation	Location	Function	Color	State	Meaning
LED 1	Right Center Nearest C5 & P2	Indicator	Red	Off	Not Used
				On	Normal Operation
				Blinking	Power Fault (note 1)

Notes:

1. The regulated power supply voltage source is monitored by LED 1, which should remain lit non-stop Blinking or failure to illuminate indicates an intermittent connection, power problem, circuit fault, etc.

ARCTIC THUNDER



TROUBLESHOOTING

CAUTION
This Video Game Machine (VGM) uses complex electronic components that are very sensitive to static electricity. Observe the following precautions before handling electronic assemblies. Failure to do so may void your warranty and could damage electronic assemblies.

- Before servicing electronics, turn off AC power to the VGM. Wait for capacitors to discharge.
- Before touching or handling electronic assemblies, discharge static electricity on your body. To discharge static, begin by connecting the line cord to a properly grounded outlet, but do not turn on the power! Next, touch the safety ground stud of the power supply chassis.
- Store electronic assemblies in an anti-static area. Use anti-static bags to store or transport circuit boards, Transport the hard drive in original shipping container.
- Do not remove or connect electronic assemblies when the power to the cabinet is switched on. Otherwise you'll damage electronic assemblies and void the warranty.
- Replace ground wires, shields, safety covers, etc., upon completion of maintenance or service. install and firmly tighten all ground and mounting screws.

COIN MECHANISM AND PRICING TROUBLESHOOTING

Symptom	Cause	Required Action
• Video Game Machine (VGM) accepts currency or tokens, but number of credits per coin or bill is incorrect	Improper settings at Pricing Menu	1. Access Diagnostic Menu, then select SWITCH TEST. Conduct test to confirm operation of game switches. 2. Access Pricing Menu, then select one of the available pricing options to verify settings.
	Faulty wiring	1. Confirm cabinet wiring is correct for this game. 2. Assure coin meter and coin switches connect properly to control input wires.
• VGM will not accept currency or tokens. • VGM will not enter play mode. • Audio and video are present.	Improper currency	1. Unlock and open cash door. Empty cash box and inspect revenue for counterfeit currency. 2. Check vault. Remove any items that block mechanism's path.
	Faulty coin mechanism	1. Unlock and open coin door. Check each mechanism for proper mounting. . Remove mechanism. • Clear currency path. • Reinstall mechanism and close latch.
	Tilted coin mechanism or game	1. Verify mechanism is level after doors close. 2. Repair or replace coin door if it is bent or damaged. 3. If necessary. adjust cabinet leg levelers to keep mechanisms level.
Coin indicators do not light	Burned-out bulb	1. Burned-out bulbs may appear white or darkened. *Replace burned-out bulb with one identically rated. 2. Check continuity with digital voltmeter.
	Open fuse circuit	1. Check fuse continuity with digital voltmeter. 2. If fuse is blown. replace fuse with an identically rated part. 3. If fuse isn't blown, check wiring.

CAUTION
Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards, ROM's or hard disk and void the warranty.

START UP TROUBLESHOOTING

Symptom	Cause	Required Action
• Video Game Machine (VGM) does not start • VGM appears completely non-functional. • No audio • No illumination • No video display	Power problem	1. Check power is switched on. 2. Make sure fans in Arcade Computer are turning. If not: Is the power supply connected to its power cable? Is power supply turned on? 3. Plug cord into AC power outlet. Verify presence of AC line voltage.
	Improper line voltage switch setting	1. Turn off power. Unplug AC line cord. Check line voltage switch. If necessary, set it to agree with local AC line voltage. Retest game.
	Open fuse	1. Turn off power. Examine fuse on power chassis. cabinet wall or electronic equipment shelf. • Replace faulty fuses with identically rated parts. • Turn on game power. If fuse opens again, check wiring harness and connectors.
	Faulty wiring	1. Remove line cord. Test line cord, power plug, and IEC connector for breaks or damage. • Verify continuity of each wire in cord. • Install cord on power chassis. • Press connector firmly to seat it. 2. Assure that cabinet wiring harness connectors fully seat in corresponding power supply and board connectors. 3. Inspect wiring for breaks or damage.
• Video Game Machine (VGM) does not start. • VGM accepts currency or tokens. • Audio and video are present.	Faulty coin mechanism	1. Unlock and open coin door. • Check each currency acceptor to assure proper mounting. • Verify each release latch is closed and locked. 2. Test mechanism with good and bad coins to see if mechanism accepts and rejects currency correctly. 3. Inspect to see if external acceptor indicators (Pricing, Flashing Arrows, etc.) are lit. 4. Verify each acceptor operates properly by placing it in working game. Replace bad parts.
	Faulty switches	1. Access Diagnostic Menu, then select SWITCH TESTS. Conduct test to confirm operation of each switch. 2. Assure no loose parts or wires are caught in switch contacts. 3. Check for continuity in each suspect switch connection (Common to Normally Open or Common to Normally Closed). 4. Replace faulty switches (bent levers, broken actuators, etc.).

Symptom	Cause	Required Action
• Video Game Machine (VGM) does not start. • VGM accepts currency or tokens. • Audio and video are present.	Faulty wiring	1. Assure no wires are caught in hinges, latches or switch contacts. 2. Check wiring continuity from circuit board connectors to acceptors.
• Video Game Machine (VGM) appears nonfunctional. • Currency acceptor price indicator is illuminated.	Power problem	1 Inspect circuit boards under low-light conditions • The LED's glow and the fan turns when processor circuits receive voltage and indicate presence of DC from power supply. However. voltages or signals may not be normal. 2. Switch on power to game machine and measure DC voltage settings. Refer to the Cabinet Wiring Diagram for specific wiring information and voltage limits. • Set the digital voltmeter to the 20-volt DC setting and measure the power connector pins. Adjust the +5V source if necessary. • Set the digital voltmeter to the 2-volt AC setting and measure DC voltages at power connector pins. Any reading here indicates that supply voltages are unstable and may contain ripple or noise.
	Faulty wiring	1. Switch off power to game. Check both wiring harness connectors and other types of connectors to make sure they fully seat onto mating board connectors.
	Faulty circuit boards or Arcade Computer	1. Run power-up self-test sequence. Note errors or failures during test. 2. Switch off power to Arcade Computer, but NOT the game machine. Wait for HDD to stop spinning, then loosen the thumbscrews on computer cover and remove. Listen *for* beeping sounds.

LINKING PROBLEM TROUBLESHOOTING

Symptom	Cause	Required Action
• Cannot connect multiple Video Game Machines (VGMs) together	Faulty wiring	1. Install required crossover between cabinets. Each coupler connects two VGMs (one pair). Do not use standard telephone type couplers or wiring for linking. 2. Use only 10 Base-T, Ethernet-type. Category 5. twisted-pair wiring. 3. Do not overextend linking cables supplied with VGM.
	Improper linking hardware	1. Use required network hub for your local network. A Hub Link Kit permits up to four VGM connections. Array completion requires basic kit brackets and spacers.
• VGM does not recognize other players in linking operation • VGM functions normally by itself	Improper settings	1. Record any error messages that occur during self-test. 2. Check that each VGM has a unique ID number. 3. Access the Diagnostic menu, then select LINKING TEST. Confirm the link is enabled.
	Power problem	1. Verify the hub receives power. AC adapter wires are thin and easily damaged.
	Faulty wiring (3 or more VGMs)	1. Inspect hub Indicator lights. • Illuminated indicator lights for each active port light up if the cable(s) are properly connected. • Check for cable continuity from hub to VGM for each indicator that failed to light. 2. Assure no loose wires are caught in hinges, doors or under cabinet. 3. Verify linking cable connects to CPU Board for each game. 4. Verify each linking cable operates properly by placing it in a working game.

CAUTION
Do not remove or install any connector when the power is turned on. Installation under power will damage the circuit boards, ROM's or hard disk drive and void the warranty.

LINKING PROBLEM TROUBLESHOOTING

Symptom	Cause	Required Action
• Some Video Game Machines (VGMs) in group link properly, while others do not	Improper hub switch setting	1. Assure switches on hub are set according to kit instructions. (VGMs on a network do not require couplers. Hub has electronic crossover.) 2. Inspect hub indicator lights for link activity. See manufacturer's literature for diagnostics.
	Wrong software version	1. Verify all linked VGMs use same software version. Machines with different versions will not recognize each other. Contact your distributor for a software update if needed.
	Faulty wiring (2 VGMs)	1. Insert only the supplied crossover connection between coupled VGMs. Standard couplers appear identical to devices supplied with games, but do not include an internal crossover. 2. Verify each linking crossover coupler operates properly by placing it in a working link between two VGMs.
	Faulty wiring (3 or more VGMs)	1. Use an additional crossover connector and cable to extend game or hub link connection. Two crossovers cancel each other out and results in same problem as no link crossover. 2. Connect cables directly to hub. Do not use a crossover coupler and hub together in single network. 3. Separate communications wiring from other wiring. Wires that must cross can only cross at right angles to limit noise pickup.

CAUTION
Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards, ROM's or hard disk drive and void the warranty.

PLAYER CONTROL TROUBLESHOOTING

Symptom	Cause	Required Action
• Intermittent or completely non-functional player controls • Video Game Machine (VGM) starts normally.	Faulty switches or lamps	1. Access the Diagnostic Menu, then select SWITCH TEST. Conduct test to confirm switch operation. 2. Access Diagnostic Menu. then select LAMP TEST. Conduct test to confirm lamp operation. 3. Check for loose parts or wires caught in switch contacts. 4. Check continuity at each switch connection (Common to Normally Open or Common to Normally Closed). 5. Verify player control operates properly by placing it in working VGM. 6. Verify light bulbs used for dashboard switches are type specified in parts listing. Other types will light. but may produce too much heat. Excess heat may cause switches to bind.
	Faulty switch wiring	1. Check for wires caught in door hinges, latches, or switch contacts. 2. Verify harness connectors are attached and fully seated. 3. Assure control switches connect properly to control input wires. 4. Check cabinet wiring is correct for this VGM.
Steering pulls to one side	Faulty Wheel Driver Board	1. Access the Diagnostic Menu, then select CALIBRATE FEEDBACK. Perform the calibration sequence. 2. Locate power amp on Wheel Driver Board's large heatsink. Test Board and replace bad part or board if necessary.
No wheel feedback Steering does not aim vehicle as expected	Improperly set calibration	1. Access Diagnostic Menu, then select CONTROLLER TEST. Select and perform one of the test sequences to aid in correcting calibration.
	Faulty circuit	1. Examine fuses and cables on Wheel Driver Board. 2. Check cables and wiring between Arcade Computer, interface board, wheel driver and motor. 3. Replace bad parts.
	Faulty motor	1. Inspect motor. Refer to the Steering ***Assembly*** Service instructions in Chapter 3 for complete details.

Symptom	Cause	Required Action
• Sloppy, unpredictable or ineffective steering • Video is present • Video Game Machine (VGM) operates normally	Blocked or faulty fan	1. Fan located on power supply acts as an exhaust fan; with power switched on, check fan airflow to assure that nothing blocks airflow.
	Faulty mechanical parts	1. Inspect motor for faulty or worn belts, bearings, couplings, gears, etc. Refer to the Steering *Assembly* Service instructions in Chapter 3 for complete details.
	Faulty Wheel Driver Board	1. Inspect Wheel Driver Board under low-light conditions. To indicate presence of AC from the transformer the LED's glow when voltage is received. However, voltages or signals may not be normal. 2. Examine fuses and cables on Wheel Driver Board. Replace bad fuses. 3. Use digital voltmeter to verify AC voltage between each fuse holder and ground. Measure approximately 25V. See Wiring Diagram. 4. Use the 20-VAC setting on digital voltmeter to measure DC voltage at motor. Do not move steering wheel, drive belt, or motor while making this measurement. Any reading indicates unstable supply that may contain ripple or noise. 5. Select CONTROLLER TEST from the Diagnostic Menu. Follow on-screen instructions to verify operation of the wheel motor and steering position sensor. 6. Verify proper operation of Wheel Driver Board by placing it in working VGM.
	Loose or worn drive belt	1. Inspect motor for faulty or worn belts, bearings, couplings, gears, etc. Refer to the Steering *Assembly* Service instructions in Chapter 3 for complete details. 2. If drive belt isn't worn or damaged, check its tightness.

WARNING
The Wheel Driver Board heatsink, power resistors, and other components may be very hot. The DC Motor in the steering wheel may also **be** hot.

VIDEO TROUBLESHOOTING

Symptom	Cause	Required Action
• Monitor appears non-functional • Audio is present • Video Game Machine (VGM) controls operate normally	Power problem	1. Verify connection of AC Power to video monitor. Inspect neck of CRT in dim light. Glowing filament near CRT base confirms monitor circuits receive power. However, voltages or signals may not be normal.
	Faulty wiring	1. Switch off power. Verify that video signal and Remote Adjustment Board connectors seat properly on Video Monitor Board. 2. Assure that video cables connect to circuit boards and Arcade Computer. 3. Assure that no wires are caught on chassis or mounting brackets.
	Improper monitor adjustments	1. Try setting Brightness and Contrast above minimum levels.
	Faulty monitor circuitry	1. Check AC line for a blown fuse on Video Monitor Board. Replacement fuses must be identically rated. 2. If the fuse is good, verify video monitor operates correctly by placing it in a working VGM. 3. If monitor is bad; Check monitor power supply. 4. If the power supply is good, Check monitor horizontal output transistor and related circuitry.
• Graphic images from game do not appear • No audio • Power-up self-test runs	Improper components	1. Verify circuit boards are correct for this game. Labels on each board record manufacturers' name, assembly number and hardware version. 2. Verify HDD is correct for this game. Label on HDD records assembly number and software version.
	Hard Disk Drive (HDD) problems	1. Allow game to load normally. Note and record any error messages that occur during self-test.
	Power Problems	1. Turn on Power. Use 20-volt DC setting on digital voltmeter to measure DC voltages present at Power connector pins. Verify +5V source if it is adjustable. Refer to Cabinet Wiring Diagram for specific wiring information and voltage limits. 2. Use 2-Volt AC setting on digital voltmeter to measure DC voltages at Power Connector pins. Any reading indicates the supply voltages are unstable and may contain ripple or noise.
• White areas at screen edges appear tinged with color • Dots at screen edges appear ovoid or cylindrical	Picture tube dynamic convergence is out Of alignment	1. Have service bureau dynamically re-converge monitor. This procedure requires removing and repositioning yoke. Service bureau must follow instructions from monitor manufacturer.

Symptom	Cause	Required Action
• Video images tear or roll, or have black bar down middle of screen	Faulty wiring	1. Check connectors and cables between circ boards and monitor for wiring continuity. 2. Assure connection of all cabinet ground especially at video monitor chassis.
	Faulty monitor circuitry	1. Verify video monitor operates correctly by necting it to working game machine 2. Assure video monitor is correct type forth Video monitors with wrong resolution ca sync.
	Improper sync signals	1. Make sure Video Board emits proper type 2. Verify jumpers are set correctly for monitor
	Electromagnetic fields	1. Move game cabinet further away from mac appliances, or other video games.
• Missing colors	Faulty wiring	1. Check connectors and cables for wiring co from circuit boards to video monitor.
	Faulty monitor color drive circuitry	1. Verify video monitor operates correctly by necting it to a working game machine.
• One color is dimmer or brighter than others . Whites appear tinted everywhere on screen	Maladjusted color bias pots	1. Access Diagnostic Menu. then select MONI TEST. Perform the COLOR BARS TEST • Adjust three bias pots for best colors. (M monitor neck boards include these pots.; 2. Check White Screen. Touch up controls. • If whites still seem tinted, have service b rejuvenate picture tube.
• Picture is too narrow	Maladjusted WIDTH pot.	1. Access Diagnostic Menu, then select MONI TEST. Perform CROSSHATCH TEST. 2. Adjust screen width using the width pot on Remote Control Board. located benind coin
• Picture is too short	Maladjusted HEIGHT pot or damaged vertical circuit	1. Access Diagnostic Menu, then select MON TEST. Perform CROSSHATCH TEST. • Adjust screen height using tne height po Monitor Remote Control Board behind coir • If pot has no effect, service vertical outpu cuit.
• Picture seems shifted to one side	Maladjusted HORIZONTAL POSITION pot	1. Access Diagnostic Test, then select MONIT TEST. Perform CROSSHATCH TEST. • Adjust Horizontal Position pot for best pi using the Monitor Remote Control Board be coin door.
• Keystone-shaped picture	Shorted turns in yoke	1. Substitute working yoke. 2. Have service bureau converge monitor. 3. Retest monitor.

AUDIO TROUBLESHOOTING

Symptom	Cause	Required Action
• No audio • Video is present • Video Game Machine (VGM) appears to operate normally	Improper volume setting	1. Access Main Menu, then select VOLUME LEVEL. Make sure Attract Mode Music is enabled. 2. Verify a//volume levels are properly set well above zero. If necessary, change volume levels to make game audible.
	Faulty wiring	1. Switch off power to game machine. Check wiring harness connections attach and fully seat onto mating board connectors. • Verify harness connects to CPU Board. • Check audio cable connectors in same way.
	Faulty or obstructed speaker	1. Remove speaker grilles and inspect speakers. 2. Clear loose parts and wires from magnets, mounting screws, terminals, and speaker cones.
	Faulty Audio Board	1. Verify proper operation of Audio Board by placing it in a working game machine.
	Power Problems	1. Use 20-volt DC setting on digital voltmeter to measure DC voltages present at Power connector pins. Verify +5V, -5V and +12V sources. Refer to Cabinet Wiring Diagram for specific wiring information and voltage limits.
• Audio is distorted, muffled or has missing frequencies.	Faulty or improper speaker	1. Switch off power to game machine. • Remove speaker grilles and inspect speakers • Verify speakers are full range *(100 to* 10.000 *Hz response)* and rated for at least 20 watts. Woofers must be rated for at least 40 watts. 2. Verify proper speaker operation by placing speaker in question in a working game machine.
	Faulty wiring	1. Multiple-speaker installations: Check for reversed speaker wiring. Weak or low frequencies and thin or hollow sound quality are symptoms of incorrectly phased speakers. *Sound tests may not detect this condition. but you can hear it during operation.
• Dead sound channel	Faulty speaker	1. Access Diagnostic Menu, then select Speaker Test. Perform one or several of the available tests to check speakers. 2. Verify proper speaker operation by connecting speaker in question to working game machine.
	Faulty wiring	1. Verify cabinet wiring is correct. Check audio wiring connectron to speakers. 2. Check audio cable connection is fully seated. 3. Check for broken or shorted wires.

WARNINGS & NOTICES

WARNING

Use of non-MIDWAY parts or circuit modifications may cause serious injury or equipment damage'

- Use only MIDWAY authorized components and parts. Failure to do so will void your warranty and may result in incorrect or unsafe operation Substitute pa-is or modifications may void the EMC directive or FCC type acceptance.
- Federal copyright. trademark and patent laws protect this Video Game Machine (VGM). Unauthorized modifications may be illegal under Federal law. The modification ban also applies to Midway Amusement Games, LLC and VGM logos, designs, publications and assemblies. Moreover. facsimiles of MIDWAY equipment (or any feature thereof) may be illegal under federal law, regardless ol whether or not such facsimiles are manufactured with Midway Amusement Games, LLC components.

WARNING

Prevent shock hazard and assure proper VGM operation. Plug this VGM into a properly grounded outlet. Do not use a cheater plug to defeat the power cord's grounding pin. Do not cut off the ground pin.

WARNING

A very small portion of the population has a condition which may cause epileptic seizures or momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are present in our daily environment. These persons may experience seizures while watching some kinds of television pictures or playing certain video games. People who have not had any previous seizures may nonetheless have an undetected epileptic condition.

If you or anyone in your family has experienced symptoms linked to an epileptic condition (e.g. seizures or loss of (awareness), Immediately consult your physician before using any video games.

We recommend that parents observe their children while they play video games. If you or your child experience the following symptoms: dizziness, altered vision, eye or muscle twitching, involuntary movements. loss of awareness, disorientation, or convulsions, *discontinue* use *immediately* and consult your physician.

(CAUTION

Information in this manual is subject to change without notice. MIDWAY reserves the right to make Improvements in equipment function, design, or components as progress in engineering or manufacturing warrants.

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NOTICE

This equipment generated. uses and can radiate radio frequency energy and if not installed and used in accordance with the *instruction* manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the Interference at his own expense.

NOTICE

When Midway Amusement Games, LLC ships a VGM, it compiles with FCC regulations. Your label is proof of compliance. Legal repercussions to the owner or distributor may result if the label is missing or damaged. If your VGM does not contain an FCC compliance label, call Midway Amusement Games, LLC immediately.

For Service:Call your authorized Midway Amusement Games, LLC distributor.

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